PROCEDURA SELETTIVA PUBBLICA PER LA COPERTURA DI N. 1 POSTO DI PROFESSORE DI SECONDA FASCIA PER IL SETTORE CONCORSUALE 09/D1 SETTORE SCIENTIFICO DISCIPLINARE ING-IND22 PRESSO IL DIPARTIMENTO DI INGEGNERIA E GEOLOGIA DELL'UNIVERSITÀ DEGLI STUDI "G. d'ANNUNZIO" DI CHIETI-PESCARA, AI SENSI DELL'ART. 18, COMMA 4, DELLA LEGGE 240/2010 – BANDITA CON D.R. N. 292 del 6/3/2019 AVVISO PUBBLICATO SULLA G.U. N. 22 IN DATA 19/03/2019

VERBALE N. 2
(Valutazione dei candidati)

La Commissione giudicatrice della procedura sopraindicata, nominata con D.R. n. 1458/2019 del 29/07/2019, composta dai:

Prof. Laura Montanaro	del Politecnico di Torino
Prof. Edoardo Bemporad	dell'Università degli Studi di Roma 3
Prof. Orfeo Sbaizero	dell'Università degli Studi di Trieste

si riunisce al completo per via telematica, per lo svolgimento delle attività di seguito elencate, il giorno 5/11/2019 alle ore 9.00, come da elenco che segue:

Prof. Laura Montanaro	account Skype
Prof. Edoardo Bemporad	account Skype
Prof. Orfeo Sbaizero	account Skype

La Commissione precisa che si riunisce per via telematica, attraverso la modalità di conversazione diretta via Skype in presenza di tutti, seguita dallo scambio di posta elettronica per l'approvazione di quanto discusso, dai seguenti account riferiti ai componenti della Commissione, come da elenco che segue:

Prof. Laura Montanaro	account e-mail	laura.montanaro@polito.it
Prof. Edoardo Bemporad	account e-mail	edoardo.bemporad@uniroma3.it
Prof. Orfeo Sbaizero	account e-mail	sbaizero@units.it

Il Presidente ed il Segretario accertano che lo strumento adottato garantisca la sicurezza dei dati e delle informazioni scambiate, l'effettiva compartecipazione dei componenti alla riunione, la contemporaneità delle decisioni, la possibilità immediata di visionare gli atti della riunione, di intervenire nella discussione, di scambiare documenti, di esprimere il proprio voto ed infine di approvare i singoli verbali.

La Commissione procede allo svolgimento delle seguenti attività:

- presa visione dell'elenco dei candidati (anche mediante l'accesso qualificato alla piattaforma telematica di Ateneo);
- dichiarazione di ciascun commissario che non sussistono situazioni di incompatibilità con i candidati ai sensi degli artt. 51 e 52 c.p.c. e di non avere relazioni di coniugio o

di unione civile o convivenza regolamentati ai sensi della L. 76/2016, di parentela ed affinità, entro il quarto grado incluso, con gli stessi;

- dichiarazione di ciascun commissario di non sussistenza di collaborazione che presenti i caratteri della sistematicità, stabilità, continuità tali da dar luogo ad un vero e proprio sodalizio professionale con i candidati;
- dichiarazione di ciascun commissario di assenza di interessi ovvero assenza di conflitto di interessi rispetto ai lavori da valutare;
- verifica del possesso dei requisiti da parte dei candidati;
- verifica della corrispondenza della documentazione caricata (upload) sulla piattaforma dedicata e gli elenchi dei documenti, titoli e pubblicazioni presentate;
- verifica del rispetto del limite massimo delle pubblicazioni che ciascun candidato poteva presentare come indicato nel bando di selezione;
- valutazione dei candidati.

In apertura di seduta il Presidente della Commissione dà lettura del messaggio di posta elettronica con il quale il Responsabile del procedimento comunica che in data 15/10/2019 si è provveduto alla pubblicizzazione dei criteri stabiliti dalla Commissione nella riunione del 9/10/2019 mediante pubblicazione sul sito web dell'Ateneo.

Constatato che, come previsto dal bando, sono trascorsi almeno 7 giorni dalla pubblicizzazione dei criteri, la Commissione può legittimamente proseguire i lavori.

La Commissione prende visione dell'elenco fornito dall'Amministrazione, nel quale sono riportati i nominativi dei candidati che hanno presentato regolare domanda di partecipazione, con l'indicazione se abbiano o meno inviato le domande, ivi compreso il relativo perfezionamento nei termini stabiliti dal bando.

Di seguito, l'elenco dei candidati che hanno presentato domanda e che non sono stati esclusi a seguito di istruttoria degli uffici per tardività della domanda o mancato perfezionamento della stessa:

- **BOCCHINI Sergio**
- **FRALEONI MORGERA Alessandro**
- **GENCHI Giada Graziana**
- **MADAGHIELE Marta**
- **PULCI Giovanni**

Ciascun Commissario dichiara che non sussistono situazioni di incompatibilità con i candidati ai sensi degli artt. 51 e 52 c.p.c. e di non avere relazioni di coniugio o di unione civile o convivenza regolamentati ai sensi della L. 76/2016, di parentela ed affinità, entro il

quarto grado incluso, con gli stessi.
Ciascun Commissario dichiara, inoltre, che non sussistono collaborazioni che presentino i caratteri della sistematicità, stabilità, continuità tali da dar luogo ad un vero e proprio sodalizio professionale con i candidati.
Successivamente la Commissione verifica il possesso dei requisiti di partecipazione da parte di ciascun candidato alla data di scadenza per la presentazione delle domande, dichiarando in merito che tutti i candidati hanno i requisiti per partecipare al concorso; procede poi a verificare la corrispondenza della documentazione caricata (upload) sulla piattaforma dedicata e gli elenchi dei documenti, titoli e pubblicazioni presentate, dichiarando in merito che i documenti presentati corrispondono a quelli richiesti e che le domande sono complete; verifica il rispetto del limite massimo delle pubblicazioni che ciascun candidato poteva presentare come indicato nel bando di selezione (n. massimo di pubblicazioni da presentare pari a 12), dichiarando in merito che ogni candidato ha presentato 12 pubblicazioni.

La Commissione, richiamati integralmente i criteri di massima fissati nel bando ed i criteri precisati nella riunione del 9/10/2019 rammenta che, sulla scorta di quanto indicato nel verbale n.1, procederà alla valutazione comparativa dei candidati finalizzata all'individuazione del candidato maggiormente qualificato rispetto **al profilo indicato mediante S.S.D.** (rif.to Mod. 1 del bando) ovvero dichiara l'assenza di candidati qualificati.
La Commissione rammenta che la valutazione della qualificazione scientifica dei candidati, basata sulla valutazione della produzione scientifica complessiva, valutazione analitica delle pubblicazioni presentate, valutazione dell'attività di ricerca, dell'internazionalizzazione, dell'attività didattica, delle attività gestionali, organizzative e di servizio, avverrà mediante l'espressione di un motivato giudizio individuale da parte dei singoli Commissari, seguito dal giudizio collegiale e complessivo espresso dall'intera Commissione, che saranno formulati mediante la compilazione delle tabelle/griglie di cui al verbale n. 1 e che saranno resi come **Allegato B** (individuale + collegiale).

Il Presidente dà atto che i componenti della Commissione hanno già, nel rispetto della tempistica concorsuale, preliminarmente visionato ed esaminato la documentazione scientifica di tutti i candidati sulla scorta degli elementi resi loro disponibili dal Responsabile del procedimento attraverso la trasmissione di credenziali di accesso alla piattaforma dedicata.

La Commissione rammenta altresì che, come stabilito nella prima riunione, si riserva, qualora ritenuto dalla stessa utile ai fini della valutazione comparativa, di specificare la valutazione esprimendo un motivato giudizio riassuntivo con relativa argomentazione.
Successivamente la Commissione, previa valutazione comparativa dei candidati, con deliberazione assunta quanto meno a maggioranza assoluta dei componenti, formulerà la graduatoria di merito dei candidati, individuando, quindi, il candidato maggiormente qualificato rispetto al settore scientifico disciplinare di cui al Mod. 1 del bando ovvero dichiara l'assenza di candidati qualificati.

La Commissione rammenta che i pesi degli elementi oggetto di valutazione sono stati indicati nella prima riunione come segue:

- valutazione della produzione scientifica complessiva: 7%
- valutazione analitica delle pubblicazioni presentate 35%
- valutazione dell'attività di ricerca: 30 %
- valutazione dell'internazionalizzazione: 8%
- valutazione dell'attività didattica: 15%
- valutazione delle attività gestionali, organizzative e di servizio: 5%
- valutazione dell'attività clinico-assistenziale ovvero attività professionale in settore non medico entrambe svolte in ambito pubblico: 0%

considerando che il totale deve risultare sempre uguale a 100.

La Commissione precisa, altresì, che i titoli presentati dai candidati saranno considerati qualora, a completamento del curriculum vitae, evidenzino uno o più degli aspetti che la stessa andrà a valutare come indicato nel primo verbale.
La Commissione, per quanto riguarda i lavori in collaborazione con i Commissari della presente procedura o con altri coautori non appartenenti alla Commissione, al fine di valutare l'apporto di ciascun candidato, rammenta di aver stabilito che saranno valutabili solo pubblicazioni scientifiche nelle quali l'apporto del candidato sia enucleabile e distinguibile.
In particolare la Commissione richiama i criteri stabiliti nella prima riunione.
Vengono quindi prese in esame le pubblicazioni redatte in collaborazione con i commissari della presente procedura di valutazione o con altri coautori non appartenenti alla Commissione, al fine di valutare l'apporto di ciascun candidato.

In ordine alla possibilità di individuare l'apporto dei singoli coautori alle pubblicazioni presentate dai candidati che risultano svolte in collaborazione con i membri della Commissione, si precisa quanto segue:

- La Prof. Laura Montanaro dichiara che nel CV del candidato Giovanni Pulci viene elencata una pubblicazione in cui ella compare come coautore rilevando che tale pubblicazione non e' stata dal candidato selezionata tra le 12 pubblicazioni presentate ai fini della valutazione.
- Il Prof. Orfeo Sbaizero ha lavori in comune con i candidati ed in particolare:

con il candidato Alessandro Fraleoni Morgera il lavoro n. 9

- Il Prof. Edoardo Bemporad ha lavori in comune con i candidati ed in particolare:

con il candidato: Giovanni Pulci il lavoro n. 5

La Commissione, sulla scorta delle dichiarazioni del Prof. Orfeo Sbaizero che si riportano: "Dichiaro che il contributo del candidato è chiaramente enucleabile e distinguibile", delibera di ammettere all'unanimità la pubblicazione in questione alla successiva fase del giudizio di merito.

La Commissione, sulla scorta delle dichiarazioni del Prof. Edoardo Bemporad che si riportano: "Dichiaro che il contributo del candidato è chiaramente enucleabile e distinguibile", delibera di ammettere all'unanimità la pubblicazione in questione alla successiva fase del giudizio di merito.

Successivamente, dopo attenta analisi comparata dei lavori svolti in collaborazione tra ciascun candidato ed altri coautori, la Commissione rileva che i contributi scientifici di ciascun candidato sono enucleabili e distinguibili tenuto conto delle autocertificazioni da loro rilasciate e sulla base dei criteri formulati nel verbale 1 e unanimemente delibera di ammettere alla successiva valutazione di merito tutti i 12 lavori presentati da ciascun candidato.

La Commissione tiene conto di tutte le pubblicazioni presentate da ciascun candidato (nei limiti e con le precisazioni indicate nel citato bando di concorso) come risulta dagli elenchi delle pubblicazioni sottoscritti da ciascun candidato, che vengono allegati al presente verbale e ne costituiscono parte integrante (**Allegato A)**

Ciascun Commissario dichiara, altresì, l'assenza di interessi ovvero assenza di conflitto di interessi rispetto ai lavori da valutare.

La Commissione procede poi all'esame del curriculum presentato da ciascun candidato, in base ai criteri individuati nella prima seduta.

La Commissione procede quindi ad effettuare la valutazione di tutti i candidati basata sulla

valutazione della produzione scientifica complessiva, valutazione analitica delle pubblicazioni presentate, valutazione dell'attività di ricerca, dell'internazionalizzazione, dell'attività didattica, delle attività gestionali, organizzative e di servizio, con espressione di motivato giudizio individuale da parte dei singoli commissari, seguito da giudizio collegiale e complessivo espresso dall'intera Commissione, formulati mediante la compilazione delle tabelle/griglie di cui al verbale n. 1 e resi come **Allegato B** (individuale + collegiale) che costituisce parte integrante del presente verbale.

Il presente verbale viene redatto dal Segretario, letto e sottoscritto con dichiarazione di formale sottoscrizione per via telematica dalla Commissione, inviato per posta elettronica, in formato .pdf, all'indirizzo concorsigelmini2019@unich.it al Responsabile del procedimento.

La Commissione si riconvoca per il giorno 8/11/2019 alle ore 14:00

La seduta è tolta alle ore 15:30

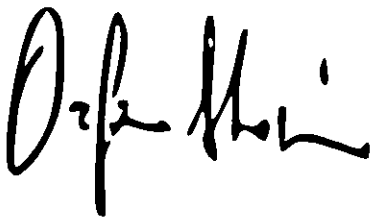
Letto, approvato e sottoscritto.

LA COMMISSIONE:

Prof. Laura Montanaro

Prof. Edoardo Bemporad

Prof. Orfeo Sbaizero



PROCEDURA SELETTIVA PUBBLICA PER LA COPERTURA DI N. 1 POSTO DI PROFESSORE DI SECONDA FASCIA PER IL SETTORE CONCORSUALE 09/D1 - SETTORE SCIENTIFICO DISCIPLINARE ING-IND22 - PRESSO IL DIPARTIMENTO DI INGEGNERIA E GEOLOGIA DELL'UNIVERSITÀ DEGLI STUDI "G. d'ANNUNZIO" DI CHIETI-PESCARA, AI SENSI DELL'ART. 18, COMMA 4, DELLA LEGGE 240/2010 – BANDITA CON D.R. N. 292 del 6/3/2019 AVVISO PUBBLICATO SULLA G.U. N. 22 IN DATA 19/03/2019

DICHIARAZIONE

LA SOTTOSCRITTO PROF.ssa Laura MONTANARO,
MEMBRO DELLA COMMISSIONE VALUTATIVA DI CUI IN TITOLO,

DICHIARA CON LA PRESENTE

DI AVER PARTECIPATO, IN VIA TELEMATICA A MEZZO DEL PROPRIO ACCOUNT E-MAIL: laura.montanaro@polito.it,
ALLA DEFINIZIONE DEI CRITERI DI MASSIMA PER LA VALUTAZIONE DEI CANDIDATI PER LA SUDDETTA PROCEDURA E DI CONCORDARE CON IL VERBALE N. 2 A FIRMA DEL PROF. Orfeo SBAIZERO, SEGRETARIO DELLA COMMISSIONE GIUDICATRICE.

IL SOTTOSCRITTO DICHIARA ALTRESI' DI ALLEGARE COPIA DEL PROPRIO DOCUMENTO DI IDENTITA'.

IN FEDE

Laura Montanaro

Torino, 18 novembre 2019

PROCEDURA SELETTIVA PUBBLICA PER LA COPERTURA DI N. 1 POSTO DI PROFESSORE DI SECONDA FASCIA PER IL SETTORE CONCORSUALE 09/D1 - SETTORE SCIENTIFICO DISCIPLINARE ING-IND22 - PRESSO IL DIPARTIMENTO DI INGEGNERIA E GEOLOGIA DELL'UNIVERSITÀ DEGLI STUDI "G. d'ANNUNZIO" DI CHIETI-PESCARA, AI SENSI DELL'ART. 18, COMMA 4, DELLA LEGGE 240/2010 – BANDITA CON D.R. N. 292 del 6/3/2019 AVVISO PUBBLICATO SULLA G.U. N. 22 IN DATA 19/03/2019

DICHIARAZIONE

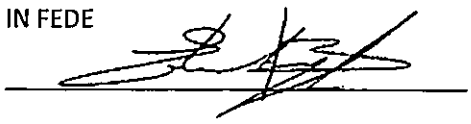
Il sottoscritto, Edoardo Bemporad, MEMBRO DELLA COMMISSIONE VALUTATIVA DI CUI IN TITOLO,

DICHIARA CON LA PRESENTE

DI AVER PARTECIPATO, IN VIA TELEMATICA A MEZZO DEL PROPRIO ACCOUNT E-MAIL: edoardo.bemporad@uniroma3.it, ALLA DEFINIZIONE DEI CRITERI DI MASSIMA PER LA VALUTAZIONE DEI CANDIDATI PER LA SUDDETTA PROCEDURA E DI CONCORDARE CON IL VERBALE N. 2 A FIRMA DEL PROF. Orfeo SBAIZERO, SEGRETARIO DELLA COMMISSIONE GIUDICATRICE.

IL SOTTOSCRITTO DICHIARA ALTRESI' DI ALLEGARE COPIA DEL PROPRIO DOCUMENTO DI IDENTITA'.

IN FEDE



Roma, 18/11/2019

PROCEDURA SELETTIVA PUBBLICA PER LA COPERTURA DI N. 1 POSTO DI PROFESSORE DI SECONDA FASCIA PER IL SETTORE CONCORSUALE 09/D1 SETTORE SCIENTIFICO DISCIPLINARE ING-IND22 PRESSO IL DIPARTIMENTO DI INGEGNERIA E GEOLOGIA DELL'UNIVERSITÀ DEGLI STUDI "G. d'ANNUNZIO" DI CHIETI-PESCARA, AI SENSI DELL'ART. 18, COMMA 4, DELLA LEGGE 240/2010 – BANDITA CON D.R. N. 292 del 6/3/2019 AVVISO PUBBLICATO SULLA G.U. N. 22 IN DATA 19/03/2019

ALLEGATO A

ELENCO DELLE PUBBLICAZIONI COME PRESENTATO DAI CANDIDATI IN SEDE DI PRESENTAZIONE DELLA DOMANDA

Candidato: Bocchini Sergio

1) Trabelsi S., Janke A., Zafeiropoulos N., Ħßler R., Stamm M., Bocchini S., Fornasieri G. "Hybrid polymers based on modified titanium oxo-clusters: Structure and thermal properties" **VDI Berichte**, 2004, 1839, 133-136

2) Bocchini S., Fornasieri G., Trabelsi S., Galy J., Rozes L., Zafeiropoulos N., Stamm M., Sanchez C., Gérard J.F. "New hybrid organic-inorganic nanocomposites based on functional [Ti 16O16(OEt)24(OEMA)8] nano-fillers" **Chemical Communications**, 2005, 2600-2602. DOI: 10.1039/b502434j

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4) Bocchini S., Frache A., Camino G., Costantini E., Ferrara G., Fatinel F. "Poly-1-butene/clay nanocomposite effect of compatibilizers on thermal and fire retardant properties" **Polymer for Advance Technologies** 2006, 17(4), 246-254 DOI: 10.1002/pat.688

5) Bocchini S., A. Frache A., Camino G., Claes M. "Polyethylene Thermal Oxidative Stabilisation in Carbon Nanotube based nanocomposites" **European Polymer Journal** 2007, 43(8), 3222-3235 DOI: 10.1016/j.eurpolymj.2007.05.012

6) Bocchini S., Morlat-Thérias S., Gardette J.L., Camino G. "Influence of nanodispersed boehmite on polypropylene photooxidation" **Polymer Degradation and Stability** 2007, 92(10), 1847-1856 DOI: 10.1016/j.polymdegradstab.2007.07.002

7) Bocchini S., Annibale E., Frache A., Camino G. "MWNT Surface Self-Assembling in Fire Retardant Polyethylene-Carbon nanotubes nanocomposites" **e-polymer** 2008 n°20

8) Fina A., Bocchini S., Camino G. "Catalytic Fire Retardant Nanocomposites" **Polymer degradation and Stability**, 2008, 93 (9), 1647-1655 DOI: 10.1016/j.polymdegradstab.2008.05.027

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10) Bocchini S., Fukushima K., Di Blasio A., Fina A., Frache A., Geobaldo F. "Polylactic acid and Polylactic acid-based nanocomposites photooxidation" **Biomacromolecules**, 2010, 11(11), 2919-2926, DOI: 10.1021/bm1006773

11) Bocchini S., Battegazzore D., Frache A. "Poly-(Butylensuccinate-co-Adipate)-Thermoplastic Starch Nanocomposite Blends." **Carbohydrate Polymers**, 2010, 82(3), 802-808 DOI: 10.1016/j.carbpol.2010.05.056

12) Patel H.A., Bocchini S., Frache A., Camino G.
"Platinum nanoparticle intercalated montmorillonite to enhance the char formation of polyamide 6 nanocomposites" **Journal of Materials Chemistry** 2010, 20(42) 9550-9558 DOI: 10.1039/c0jm01755h

13) Bocchini S., Di Blasio A., Frache A.
"Influence of MWNT on polypropylene and polyethylene photooxidation." **Macromolecular Symposia**, 2011, 301(1), 16-22, DOI: 10.1002/masy.201150303

14) Battegazzore D., Bocchini S., Frache A.
"Crystallization kinetics of poly(lactic acid)-talc composites" **Express Polymer Letters**, 2011, 5 (10), 849-858, DOI: 10.3144/expresspolymlett.2011.84

15) Monticelli O., Cavallo D., Bocchini S., Frache A., Carniato F., Tonelotto A.
"A Novel Use of Ti-POSS as Initiator of L-Lactide Ring-Opening Polymerization" **Journal of Polymer Science Part A: Polymer Chemistry** 2011, 49(22), 4794–4799 DOI: 10.1002/pola.24926

16) Fina A., Bocchini S., Camino G.
"Thermal evolution of nanocomposites. When nanoparticles are effective in polymer fire retardancy" **"22nd Annual Conference on Recent Advances in Flame Retardancy of Polymeric Materials 2011"** 2011, 354- 360

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"Simple method for the preparation of composites based on PA6 and partially exfoliated graphite." **Journal of Nanomaterials**, 2012, (2012), Article ID 938962, 5 pages DOI:10.1155/2012/938962

18) Bueno-Ferrer C., Hablot E., Garrigós M. D. C., Bocchini S., Averous L., Jiménez A. "Relationship between morphology, properties and degradation parameters of novative biobased thermoplastic polyurethanes obtained from dimer fatty acids." **Polymer Degradation and Stability.** 2012 97(10) 1964–1969. DOI: 10.1016/j.polymdegradstab.2012.03.002

19) Fukushima K., Wu M.H., Bocchini S., Rasyida A., Yang M.C.
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"Comparative study of filler influence on polylactide photooxidation."**Express Polymer Letters**, 2013 7(5) 431–442. DOI:10.3144/expresspolymlett.2013.40

21) Bocchini "Actuators based on intrinsic conductive polymers/carbon nanoparticles nanocomposites." In Y. Bar-Cohen (Ed.), **Proceedings of SPIE - The International Society for Optical Engineering Volume 8687 Electroactive Polymer Actuators and Devices (EAPAD)** 2013 (p. 86872I). DOI:10.1117/12.2009634

22) Bocchini S., Patel H., Frache A.
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"Impact of synthetic talc on PLLA electrospun fibers." **European Polymer Journal**, 2013 49(9), 2572–2583. DOI:10.1016/j.eurpolymj.2013.05.017

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"Nanocomposites combustion peculiarities. A case history: Polylactide-clays." **European Polymer Journal**, 2013 49(4), 932–939. DOI:10.1016/j.eurpolymj.2012.11.010

25) Bocchini S., Chiolerio A., Porro S., Accardo D., Garino N., Bejtka K., Perrone D., Pirri C. F.
"Synthesis of polyaniline-based inks, doping thereof and test device printing towards electronic applications." **Journal of Materials Chemistry C**, 2013 1(33), 5101-5109. DOI:10.1039/c3tc30764f

26) Battegazzore D., Bocchini S., Alongi J., Frache A.
"Rice husk as bio-source of silica: preparation and characterization of PLA–silica bio-composites." **RSC Advances**, 2013 4(97), 54703–54712. DOI:10.1039/C4RA05991C

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"Flame retardant and thermal behavior of polylactide/expandable graphite composites" **Polimery/Polymers,** 2013 58(5), 361-364

28) Battegazzore D., Bocchini S., Alongi J., Frache A.
"Plasticizers, antioxidants and reinforcement fillers from hazelnut skin and cocoa by-products: Extraction and use in PLA and PP." **Polymer Degradation and Stability,** 2014 108, 297–306. DOI:10.1016/j.polymdegradstab.2014.03.003

29) Battegazzore D., Bocchini S., Alongi J., Frache A., Marino F.
"Cellulose extracted from rice husk as filler for poly(lactic acid): preparation and characterization." **Cellulose,** 2014 21(3), 1813–1821. DOI:10.1007/s10570-014-0207-5

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33) Ariano P., Accardo D., Lombardi M., Bocchini S., Draghi L., De Nardo L., Fino P.
"Polymeric materials as artificial muscles: an overview." **Journal of Applied Biomaterials & Functional Materials,** 2015, 13(1), 1-9. DOI:10.5301/jabfm.5000184

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Candidato: Fraleoni Morgera Alessandro

RP1) A. Fraleoni, P. Zanirato, "Boron trifluoride-assisted reactions of 1-benzothiophen-3(2H)-one with various ketones: A convenient entry to 2-methylene-1-benzothiophen-3(2H)-one and/or 6H-di[1]benzothieno[3,2-b:2,3-e]pyran derivatives", *J. Chem. Res. (S)*, 1999, 542-543 (IF 2000 - first year available: 0.522)

The title compounds are obtained in moderate to high yields by BF3- assisted reaction of 1-benzothiophen-3(2H)-one with nine ketones in diethyl ether at room temperature; the relative amounts of pyran 1 and ylidene 2 prove to be dependent upon electronic and steric factors.

RP2) C. Della Casa, A. Fraleoni, P. Costa Bizzarri and M. Lanzi, "New 3-alkylthiophene copolymers functionalized with a NLO chromophore", *Synth. Met.*, 2001, 124, 467-470 (IF 2001: 1.158)

The soluble polythiophenes functionalized with a non-linear optical chromophore were prepared using copolymerization. The microstructure and the composition of the copolymers was determined through nuclear magnetic resonance spectroscopy. Two different types of solvent effects were identified. The first effect was on the conformation of the thiophene backbone and the other was on the electronic transition energy of the azobenzene unit.

RP3) C. Della Casa, A. Fraleoni, P. Costa Bizzarri, M. Lanzi, L. Paganin, "Synthesis and characterization of poly(3-alkylthiophenes) with NLO chromophoric groups in side chains", *Macromol. Symp.*, 2002, 180, 217-221 (IF 2002: 0.758)

Polythiophene copolymers containing alkyl side chains of different length and partially functionalized with chromophoric groups have been synthesized by FeCl3 oxidative coupling of 3-alkylthiophenes and functionalized 3-alkylthiophenes. Composition, molecular weigth and configuration of the soluble fraction of the copolymers have been investigated and some structure-property correlations have been evidenced.

RP4) M. Lanzi, L. Paganin, P. Costa-Bizzarri, C. Della-Casa, A. Fraleoni, "Facile synthesis of soluble multifunctional polyalkylthiophenes", *Macromol. Rapid Comm.*, 2002, 23, 630-633 (IF 2002: 2.901)

A method of synthesis leading to poly(3-alkylthiophene)s with two different functional groups in the side chain, one of which is an NLO-active chromophore, has been developed. This method, based on the post-functionalization of a reactive homopolymeric precursor, permits to prepare different polyfunctional polymers that are fully soluble in the most commonly used organic solvents. The procedure is very easy to perform, cost-effective, highly versatile and reproducible.

RP5) M. Lanzi, P. Costa Bizzarri, C. Della Casa, L. Paganin, A. Fraleoni, "Synthesis, characterization and optical properties of a regioregular and soluble poly[3-(10-hydroxydecyl)-2,5-thienylene]", *Polymer*, 2003, 44, 535-545 (IF 2003: 2.340)

The preparation of a regioregular trimethylsilanyloxydecyl 3-substituted polythiophene and its conversion to the corresponding hydroxydecyl polymer, which is soluble in common organic solvents, is described both in solution and in film. The chromic behaviour of the hydroxy functionalized polymer was investigated by UV-vis spectroscopy in different solvent/non-solvent mixtures and in the solid state by exposing the polymer adsorbed on hydroxylic matrices to methanol vapours.

RP6) A. Fraleoni-Morgera*, C. Della Casa, P. Costa Bizzarri, M. Lanzi, "Investigation on Different Procedures in the Oxidative Copolymerization of a Dye-Functionalized Thiophene with 3-Hexylthiophene", *Macromolecules*, 2003, 36, 8617-8620 (IF 2003: 3.621)

For the purpose of preparing materials for nonlinear optics applications, a 3-ethylthiophene bearing an NLO-active chromophoric group as a substituent at the end of the ethylic chain was copolymerized with 3-hexylthiophene. Different FeCl3-based oxidative polymerization conditions in solvents such as CH3NO2 and CCl4 and their effects on the copolymers characteristics and solubility in CHCl3 (i.e., the copolymer's soluble fraction) were examined. This work allowed to achieve a satisfactory chloroform-soluble fraction of the copolymer, still containing a notable amount of NLO-active group, and to tune to some extent the main characteristics of the copolymer; moreover, the behavior of the monomers-solvent-oxidant system was investigated.

RP7) L. Setti, C. Piana, S. Bonazzi, B. Ballarin, D. Frascaro, A. Fraleoni-Morgera, S. Giuliani, "Thermal Inkjet Technology for the Microdeposition of Biological Molecules as a Viable Route for the Realization of Biosensors", *Anal. Lett.*, 2004, 37, 1559-1570 (IF 2004: 1.165)

Recent progress in inkjet printing of parts of biosensors are highlighted, with particular reference to the printing of biologically active molecules. We describe a system constituted by a thermal inkjet printer, adapted to layering a bidimensional array of dots [701 x 701 dots per inch] on solid supports. The printer was used to depose a β-galactosidase (GAL)-containing ink on a polyester sheet, with dots obtained from 10 pL drops, each drop containing in turn 6 pg of enzyme. The activity of GAL after the preparation was determined using a colorimetric probe (Brilliant Blue FCF). The activity loss of the microdeposed enzymes was found to be around 15%, showing that the 2 μsec-lasting thermal shock experienced by the biomolecule into the printhead nozzle affects to a lesser extent the activity of the thermal inkjet deposited enzyme. In conclusion, the most recent findings of our group in this line are depicted, and a view of possible future developments of the " biopolytronics" field is outlined.

RP8) B. Ballarin, A. Fraleoni Morgera, D. Frascaro, S. Marazzita, C. Piana, L. Setti, "Thermal Inkjet microdeposition of PEDOT:PSS on ITC-Coated Glass and characterization of the obtained film", *Synth. Met.*, 2004, 146, 201-205 (IF 2004: 1.278)

In view of direct inkjet printing of low-cost sensors, we describe here the thermal printing of a thin film of a commercially available conjugated polymer (poly(3,4-ethylenedioxythiophene):polystyrene sulfonic acid, PEDOT:PSS). The printed film has been investigated by optical microscopy, AFM and cyclic voltammetry. The results have been compared to the ones obtained for a continuous film of the same polymer deposed by spin-coating. No appreciable differences were noted between the electrochemical behaviour of the two samples, indicating that the thermal printing of the polymer did not alter appreciably the material properties. Our findings indicate that the thermal printing route may be then a good alternative for the controlled deposition of thin films of conjugated polymers.

RP9) A. Fraleoni-Morgera*, S. Marazzita, D. Frascaro, L. Setti, "Influence of a non-ionic surfactant on the UV–vis absorption features of regioregular head-to-tail poly(3-hexylthiophene) in water-based dispersions", *Synth. Met.*, 2004, 147, 149-154 (IF 2004:1.278)

The use of a non-ionic surfactant for preparing a stable aqueous dispersion of regioregular head-to-tail poly(3-hexylthiophene) (R-P3HT) is described. The spectral features of a THF solution of R-P3HT dispersed in water are investigated by means of UV-vis absorption spectroscopy. A clear difference between the classical solvatochromic phenomenology and the behaviour of the realized polymer/THF/water/surfactant system is observed, pointing to interactions between the polymeric alkylic side chains and the surfactant hydrophobic tail. From a technological point of view, the presented water-based dispersions, reducing use of toxic organic solvents, may be an interesting and environmentally friendly approach to the processing of conjugated polymers.

RP10) A. A. Apostoluk, L. Rocha, C. Florini-Debuisschert, C. Sentein, P. Raimond, L. Setti, A. Fraleoni-Morgera, J.-M. Nunzi, "Semiconducting dye-functionalised poled polymers for photovoltaic applications", *Mater. Sci. Poland*, 2004, 22, 397-406 (IF 2005 -first year available: 0.571)

In order to build efficient single-layer polymer photovoltaic devices, the realization of an equivalent distributed p-n junction is proposed. Orientation in the initially centrosymmetric material is obtained by ordering polar molecules contained in a polymer matrix with a DC field. The molecular rectification effect induced in an oriented polymer film improves the efficiency of polymeric semiconducting devices like solar cells. The first experiments were conducted with a poly(methylmethacrylate) (PMMA) matrix containing azo-dye compounds (such as the Disperse Red 1, DR1) as the polar molecules, grafted onto the chains of the polymer backbones. Although this material allows for high orientation efficiencies, it is not adapted for photovoltaic applications, since DR1-MMA has very poor semiconducting properties due to the dielectric nature of PMMA. Organic semiconductors are uncommon and it is difficult to find an appropriate polymer system. We present preliminary results obtained for two intrinsically semiconducting and dye-functionalised polymer systems which may be found applicable in the fabrication of organic photovoltaic solar cells using the concept of polar molecular ordering. We use polymer systems with a covalent bond between the dye

molecule and conjugated backbone to obtain a high dye content and to avoid phase separation problems. To achieve the largest stable molecular polar orientation possible and to optimise the electric field stored in an oriented structure, we studied the orientation parameters of samples, i.e., the orientation field, temperature, poling duration, and cooling conditions.

RP11) L. Setti, A. Fraleoni-Morgera, B. Ballarin, A. Filippini, D. Frascaro, C. Piana, "An amperometric glucose biosensor prototype fabricated by thermal inkjet printing", *Biosens. Bioel.*, 2005, 20, 2019-2026 (IF 2005: 3.463)

The prototype of an amperometric glucose biosensor was realized by thermal inkjet printing using biological and electronic water-based inks, containing a glucose oxidase (GOD) from Aspergillus niger and the conducting polymer blend poly(3,4-ethylenedioxythiophene/polystyrene sulfonic acid) (PEDOT/PSS), respectively. The biosensor was fabricated microdepositing PEDOT/PSS and GOD, in sequence, on ITO-glass, by a commercial inkjet printer, with the help of a commercial software. High density microdots matrices were so-realized, with a calculated resolution of about 221 x 221 dpi (dot per inch). By means of a rapid and easy assay it was demonstrated that no activity loss occurred upon the printing of GOD, despite of the use of a thermal printhead. The device was encapsulated in a semipermeable membrane of cellulose acetate, applied by dip-coating, in order to prevent dissolution of the enzyme and/or PEDOT/PSS in water. The preliminary response of the electrode was measured in an aqueous glucose solution in the presence of ferrocenemethanol (FeMeOH) as a mediator, and resulted linear up to 60 mM in glucose. The best sensitivity value achieved was 6.43 $\mu A\ M^{-1}\ cm^{-2}$ (447 $nA\ M^{-1}\ U^{-1}\ cm^{-2}$). The characteristics of the device, and the possible performance improvements have been analyzed and discussed. The reported findings indicate that inkjet printing could be a viable instrument for the easy construction of a working biosensor via direct digital design using biological and conductive polymer based inks. Such an approach may be seen as an example of "biopolytronics".

RP12) A. Fraleoni-Morgera*, C. Della Casa, P. Costa Bizzarri, M. Lanzi, A. Missiroli, "Completely Soluble Azo-Dye-Substituted Thiophenic Copolymers through Proper Molecular Design", *Macromolecules*, 2005, 38, 3170-3175 (IF 2005: 4.024)

Copolymerizations at various feed ratios between azo-dye-substituted thiophenes and 3-hexylthiophene under FeCl3-based oxidative conditions have been conducted. It is shown that when the molecular structure of the dye is properly designed, completely soluble copolymers, with molecular weigths ranging around 104 as Mn and dye-substituted monomer content up to 50% in a molar ratio, may be prepared, as well as a completely soluble homopolymer. In addition, the so-obtained polymers evidenced excellent filmability from a variety of solvents. The dye-substituted monomer content of the soluble copolymers has been assessed by 1H NMR analysis via a convenient choice of the reference signals. In the completely soluble copolymers the dye-substituted monomer content is well correlated to the feed within a range between 0 and 75% of dye-substituted unit in the feed, which corresponds to a 0-50% range in the copolymer composition, still conserving satisfactory molecular weights. Following these observations and analyzing the characteristics of the polymers, a lower reactivity of the dye-functionalized unit toward 3-hexylthiophene was evidenced in the used reaction conditions, and some hypotheses on this finding are presented.

RP13) C. Della-Casa, A. Fraleoni-Morgera, M. Lanzi, P. Costa-Bizzarri, L. Paganin, F. Bertinelli, L. Schenetti, A. Mucci, M. Casalboni, F. Sarcinelli, A. Quatela, "Preparation and characterization of thiophene copolymers with second order non-linear optical properties", *European Pol. J.*, 2005, 41, 2360-2369 (IF 2005: 1.765)

Azobenzene-substituted polythiophenes were prepared by copolymerization of 3-alkylthiophenes functionalized with an azo-chromophore and 3-alkylthiophenes as plastifying comonomers to improve solubility. Monomers with different oligomethylenic spacer and alkylic chain lengths were synthesized and copolymerized via FeCl3 oxidative polymerization. Polymer soluble fractions were characterized by 1H and 13C NMR, FTIR, UV-Vis spectroscopy, and GPC, DSC and TGA. Second-order non-linear optical properties were measured by the second harmonic generation technique

RP14) S. Cheylan, A. Fraleoni-Morgera, J. Puigdollers, C. Voz, R. Alcubilla, L. Setti, G. Badenes, "Comprehensive study of a novel thiophene-based polymer", 2005, *Proceedings of SPIE - The International Society for Optical Engineering*, 5937, 1-8 (IF not available)

We report here on the results of the characterization of a novel -OPhCN substituted thiophenic monomer, and of the obtained copolymers between the latter and the plastifying comonomer 3-hexylthiophene. The polymer evidences an excellent filmability from various organic solvents as well as an enhanced photoluminescence. The characteristics of the polymer were characterized by FTIR and XRD as well as photoluminescence. A bandgap of 2.0eV was obtained which corresponds to orange emission. Furthermore, a single layer organic device was fabricated and resulted in bright stable electroluminescence at room temperature. All of the results indicate that this polymer is a promising emissive material for application in light-emitting devices (LEDs).

RP15) S. Cheylan, A. Fraleoni-Morgera, J. Puigdollers, C. Voz, L. Setti, R. Alcubilla, G. Badenes, P. Costa-Bizzarri, M. Lanzi, "Study of a thiophene-based polymer for optoelectronic applications", *Thin Solid Films*, 2006, 497, 16-19 (IF 2006: 1.666)

A thiophene-based conjugated polymer bearing a cyano group (-CN) as a side chain substituent was successfully synthesized. The polymer evidences an excellent filmability from various organic solvents as well as an enhanced photoluminescence. The polymer has been characterized optically (Fourier Transformed Infrared spectroscopy, absorption and photoluminescence) in solution and in film, while X-ray diffraction measurements (XRD) of thin films were performed to investigate its bulk morphological features. From the absorption edge of the spectrum of a thin polymer film, the optical band gap of the polymer is estimated to be 2.0 eV, which corresponds to orange emission. Furthermore, a single layer light emitting diode (LED) was fabricated. The device produced bright stable electroluminescence at room temperature. All of the results indicate that this polymer is a promising emissive material for application in polymeric LEDs.

RP16) A. Fraleoni-Morgera, P. Zanirato, "BF3.OEt2-promoted synthesis of acridines via N-aryl nitrenium-BF3 ions generated by dissociation of 2-oxo azidoarenes in benzene", *Arkivoc*, 2006, 12, 111-120 (IF 2006: 0.800)

2-Oxo-substituted aryl azides such as 2-azidobenzenecarbaldehyde 1, 1-(2-azidophenyl)-1-ethanone 2 and (2-azidophenyl) (phenyl)methanone 3 react with benzene in the presence of BF3·OEt 2, mainly affording 9-substituted acridines via formal 2-anilino-oxobenzene-BF 3 complexes rapidly followed by intramolecular cyclo-dehydration at the activated carbonyl groups. Under the same conditions, 2-azidobenzoic acid 4 gives mainly 2-anilinobenzoic acid 4b together with trace amounts of the 9(10H)-acridinone 4a. On the other hand, 2-azidobenzenecarbonitrile 5 gives the 9-amino acridine 5a via a conjugated imine, which undergoes intramolecular cyclization. The BF3·OEt 2 promoted dissociation of aryl azides to aryl nitrenium ions is compared with those promoted by AlCl 3 or a strong protic acid (TFA/TFSA mixture).

RP17) Boscaleri, F. Castagnoli, F. Mencaraglia, P. Rissone, F. Rotini, E. Ronchi, L. Setti, A. Fraleoni-Morgera, S. Cortiglioni, "Some technical solutions in stratospheric platform design devoted to protecting power sources from damages on landing", *European Space Agency Special Publication*, 2007, 647 SP, 557-560 (IF not available)

Researchers in astrophysics and earth observation are still interested in balloon campaigns for making measurements outside the atmosphere. It is possible to trim a bit more from the ballooning costs by increasing the number of parts that can be reused, and by the careful design, the integration and the consolidation of a standard gondola apparatus (something like the mass production of cars). This paper will focus on one of the aspects capable of reducing costs, namely reusable power sources such as solar panels (SP) and fuel cells (FC) and how to protect them during the most difficult phases of the flight (take-off, landing). We will describe two possible ways of deploying and stowing a SP, and report the results of a thermal simulation aimed at ascertaining whether FC may be used in a stratospheric balloon environment.

RP18) L. Setti, A. Fraleoni-Morgera, I. Mencarelli, A. Filippini, S. Ballarin, M. Di Biase, "An HRP-based amperometric biosensor fabricated by thermal inkjet printing", *Sens. Act. B*, 2007, 126, 252-257 (IF 2006: 2.331)

Direct inkjet printing of a complete and working amperometric biosensor for the detection of hydrogen peroxide, based on horseradish peroxidase (HRP), has been demonstrated. The device has been realized with a commercial printer. A thin layer of PEDOT:PSS, which was in turn covered with HRP, was inkjet printed on top of an ITO-coated glass slide. The active components of the device retained their properties after the thermal inkjet printing. The whole device has been encapsulated by means of a selectively permeable cellulose acetate membrane. The successful electron transfer between the PEDOT:PSS covered electrode and the enzyme has been demonstrated, and the biosensor evidenced very good sensitivity, in line with the best devices realized with other techniques, and a remarkable operational stability. This result paves the way for an extensive application of "biopolytronics", i.e. the utilization of conductive/semiconductive polymers and biologically active molecules to design bioelectronic devices using a common PC, and exploiting normal commercial printers to print them out.

RP19) S. Cheylan, H. J. Bolink, A. Fraleoni-Morgera, J. Puigdollers, C. Voz, I. Mencarelli, L. Setti, R. Alcubilla, G. Badenes, "Improving the efficiency of a light-emitting diode based on a thiophene polymer containing a cyano group", *Org. El.*, 2007, 8, 641-647 (IF 2006: 3.418)

We report on the overall improvement of a single layer organic light-emitting diode device based on poly{[3-hethylthiophene]-co-3-[2-(p-cyano-phenoxy)ethyl]thiophene} or namely PTOPhCN. This polymer was recently developed by adding a cyano group as a side-chain substituent of the thiophenic backbone onto the main polymer chain and showed promising results for light-emitting diode devices. Using an improved

device layout, bright red electroluminescence was obtained at 4 V and showed a luminance of about 400 cd/m2 at 8 V with current densities in the order of 6000 A/m2.

RP20) P. Cardillo, L. Gigante, A. Lunghi, A. Fraleoni-Morgera, P. Zanirato, "Thermochemical evaluation of the intrinsic molecular reactivity of tosyl azide and 4,4'-diazidodiphenyl ether and sulfide, " *Cent. Eur. J. Energ. Mater.*, 2007, 4. 81-93 (IF 2007: NA. IF 2012 (first available): 1.327. **NOTE**: THIS JOURNAL IS COVERED BY SCOPUS ONLY SINCE 2011 ONWARDS, THEREFORE THIS PARTICULAR PAPER IS NOT INDEXED BY SCOPUS)

The exothermic decompositions of the tosyl azide 1 and two diazides, 4,4'-diazidodiphenyl ether, (N3C6H4)2O 2 and 4,4'-diazidodiphenyl sulfide, (N3C6H4)2S (3), were studied theoretically using the CHETAH protocol, and experimentally using DSC, weight loss TGA-FTIR and C80-FTIR techniques. Numerical modelling and MS-spectroscopy were also performed to estimate the nature of the intrinsic molecular reactivity of the azides 1–3 as possible early stages of an oxidative self-heating process.

RP21) A. Fraleoni-Morgera, L. Giorgini, P. Zanirato, "[Arylazobenzene-BF3] dyes: Electronic absorption and NMR spectroscopic evidence for a novel class of dyes stable in aprotic solvents", *Dyes Pigments*, 2008, 76, 394-399 (IF 2006: 1.909)

Treatment of a number of 4-substituted arylazobenzenes (-H, -Me, -CF3, -Br, -F and -OMe) with BF3·OEt2 in dry chloroform solution afforded chromophores that exhibited significant hyper- (log ε 4.41-4.60) and bathochromic shifts (λ_{max} 416-473) in electronic spectra, together with significant shifts in their 1H NMR and 13C NMR spectra, indicating the formation of novel chemical species. It is proposed that complexes are formed between the azo dyes and the Lewis acid, similarly to what happens for the well-known protic acids. The equilibrium constants (log K) of the proposed complexes have been calculated from the experimental data. Numerical modelling has also been performed to investigate the nature of the new systems, revealing a correlation between the electronic levels of the azo dye and the ones of the BF3·OEt2.

RP22) P. Cardillo, L. Gigante, A. Lunghi, A. Fraleoni-Morgera, P. Zanirato, "Hazardous N-containing systems: thermochemical and computational evaluation of the intrinsic molecular reactivity of some aryl azides and diazides", *New J. Chem.*, 2008, 1, 47-53 (IF 2008: 2.942)

The exothermic decompositions of the tosyl azide 1, five substituted aryl monoazides 2-6 and two diazides: 1-azido-4-(4-azidophenoxy)benzene 7 and 1-azido-4-[(4-azidophenyl)sulfanyl]benzene 8 were studied experimentally using DSC, weight loss TGA-FTIR and C80-FTIR techniques, and theoretically using the CHETAH software. Numerical modelling and electron impact mass spectrometry (EI-MS) were also performed to investigate the nature of the intrinsic molecular reactivity of azides 1-8, and the possible early stage rate-controlling of an oxidative self-heating process. Significant data were obtained in the instances of 4-methylbenzenesulfonyl azide 1, 4-azido-1,1'-biphenyl-2,2-azido-1, 1,1'-biphenyl 3 and 1-azido-2-(trifluoromethyl)benzene 6. The most likely decomposition pathways of the azides are proposed to explain the observed thermal behavior.

RP23) L. Setti, A. Fraleoni-Morgera, I. Mencarelli, C. Bertoni, "Preliminary studies on the influence of surface morphological treatments of indium tin oxide on the performances of horseradish peroxidase-based biosensors", *Sensor Lett.*, 2008, 6, 646-653 (IF 2008: 1.160)

The electrochemical treatment of Indium Tin Oxide (ITO) supported on glass slides was explored as a convenient route to create nanostructured electrodes, in an attempt to increase the performances of enzyme-based amperometric sensors. The effect of this treatment on the morphological, physical and optical properties of the ITO (SEM, AFM, WLI, X-ray analysis, UV-Vis transmittance) was investigated, as well as on its electrical characteristics (sheet resistance). Working bioelectrodes were fabricated on the nanostructured ITO layers, and the relations between the characteristics of the devices and the treatment effects on the ITO were analyzed and discussed. A positive effect of the electrochemically obtained nanostructures on the affinity of the organic layer for the electrons injected from the ITO surface was found.

RP24) B. Fraboni, R. DiPietro, A. Castaldini, A. Cavallini, A. Fraleoni-Morgera, L. Setti, I. Mencarelli, C. Femoni, "Anisotropic charge transport in organic single crystals based on dipolar molecules", *Org. Electron.* 2008, 9, 974-978 (IF 2008: 3.590)

We studied the anisotropic charge transport properties of solution-grown organic single crystals based on a dipolar molecule (4-hydroxy-cyanobenzene) by field effect devices and by spectral photocurrent analyses. Optical excitation differently affects the flow of charge carriers along the two main planar crystal axes, altering the charge transport anisotropy induced by the molecular π-orbitals stacking. We attribute this behaviour to the presence of an intrinsic molecular dipole and to its different orientation within the crystal lattice and we advance a hypothesis on the nature of the observed band of deep trapping states.

RP25) B. Fraboni, R. DiPietro, A.Castaldini, A. Cavallini, A. Fraleoni Morgera, L. Setti, I. Mencarelli, C. Femoni "Anisotropic charge transport in organic single crystals based on dipolar molecules" *Mat. Res .Soc. Symp. Proc.* 2008, 1091, 37-43 (IF not available)

We studied the anisotropic charge transport properties of solution-grown organic single crystals based on a dipolar molecule 4HCB (4-hydroxy- cyanobenzene) by electrical transport measurements, current-voltage and space charge limited current (SCLC), and by X-ray diffraction analyses. Optical excitation differently affects the flow of charge carriers along the two main planar crystal axis, altering the charge transport anisotropy induced by the molecular π -orbitals stacking. We attribute this behaviour to the presence of an intrinsic molecular dipole and to its different orientation within the crystal lattice. The anisotropy of transport along the three crystallographic directions has been assessed by electrical characterization and correlated to the crystal molecular packing as determined by X-ray analyses.

RP26) B. Fraboni, C. Femoni, I. Mencarelli, L. Setti, R. DiPietro, A. Cavallini, A. Fraleoni-Morgera", "Solution-grown macroscopic organic single crystals exhibiting three-dimensional anisotropic charge-transport properties", *Adv. Mater.* 2009, 21, 1835-1839 (Journal main cover; IF 2009: 8.379).

A millimeter-sized solution grown (SG) organic single crystals based on 4-hydroxycyanobenzene (4HCB), which exhibited 3D anisotropic electrical properties along the three crystallographic axes a, b (constituting the main crystal flat face), and c (the crystal thickness), measured over several different samples, was reported. FET devices were used to estimate the directional carrier mobilities in the dark at room temperature and atmosphere along the two main axes. The mobility was determined by means of space charge-limited current (SCLC) measurements along the crystal thickness, axis c. X-ray diffraction analyses on some of the as-prepared crystals were conducted to verify the crystalline structure of the SG 4HCB crystals. The re-determination of the unit cell confirmed that the contacts were exactly aligned to the crystallographic axes a and b, and that the electrical stress did not alter the crystal lattice

RP27) B. Fraboni, A. Fraleoni-Morgera, A. Cavallini, "Three-dimensional anisotropic electronic properties of solution grown organic single crystals measured by Space-Charge Limited Current (SCLC)" *Mat. Res .Soc .Symp. Proc.* 2009, 1154, 63-68 (IF not available)

Organic single crystals offer the interesting and unique opportunity to investigate the intrinsic electrical behaviour of organic materials, excluding hopping phenomena due to grain boundaries and structural imperfections. Their structural asymmetry permits also to investigate the correlation between their three-dimensional order and their charge transport characteristics. Here we report on millimeter-sized, solution-grown organic single crystals, based on 4-hydroxycyanobenzene (4HCB), which exhibit three-dimensional anisotropic electrical properties along the three crystallographic axes a, b (constituting the main crystal flat face) and c (the crystal thickness), measured over several different samples. The carrier mobility was determined by means of space charge limited current (SCLC) and air-gap field effect transistors fabricated with 4HCB single crystals and the measured values well correlate with the structural packing anisotropy of the molecular crystal. A differential analysis of SCLC curves allowed to determine the distribution and the concentration of the dominant electrically active density of states within the gap.

RP28) B. Fraboni, A. Fraleoni-Morgera, A. Cavallini, "Three-dimensional anisotropic density of states distribution and intrinsic-like mobility in organic single crystals", *Org. Electron.*, 2010, 11, 10-15. (IF 2010: 3.998)

Organic semiconducting molecules are receiving a large attention because of their potential applications, spanning from OLEDs to plastic photovoltaics to bio-chemical sensors. However, the electronic transport properties of these materials are still not fully understood, and organic single crystals (OSCs) may represent model materials for assessing the charge transport mechanisms, thanks to their high purity and molecular order. Here we show for the first time that solution-grown, millimiter-sized organic single crystals of 4-hydroxycyanobenzene (4HCB) possess a clear and reproducible three-dimensional anisotropy in their main transport parameters: (i) charge carrier mobility, (ii) distribution of the electronic density of states and (iii) deep traps energy and concentration, and we report intrinsic-like three-dimensional mobility values for these crystals. These findings demonstrate that the electronic spatial anisotropy of OSCs extends well beyond the carrier mobility, and open the way to the development of novel electronic device architectures based on the simultaneous exploitation of different electronic responses along the three spatial directions of the crystal.

RP29) A. Fraleoni-Morgera", B. Fraboni, A. Cavallini, "Solution growth of single crystals of 4-hydroxycyanobenzene (4HCB) suitable for electronic applications", *J. Cryst. Growth*, 2010, 312, 3466-3472 (IF 2010: 1.737)

Squared, platelet-like single crystals of 4-hydroxycyanobenzene (4HCB) have been grown from solutions based on ethylic ether and petroleum ether. Properly modifying the growth conditions, in terms of both solvent used for the growth and concentration of 4HCB in the starting solution, allowed one to tune the

planar dimensions of the platelets in the range 2-6 mm, and their thickness in the range 150-600 μm. In this way samples well suited for desired practical manipulation and electronic measurements may be obtained. Moreover, lowering the growth temperature resulted in larger but still thin 4HCB crystals. The ability to tailor crystal thickness has allowed one to study their Space-Charge Limited Current (SCLC) behaviour along that dimension, showing that the so-contacted samples exhibit intrinsic-like bulk conduction behaviour, and are hence well suitable for electronic studies and applications.

RP30) A. Fraleoni-Morgera, "Fast Fabrication of Large Area, Nanostructured Arrays out of Polymers and Carbon Nanotubes by Wet-processing", *Small*, 2011, 7, 321–325 (IF 2011:8.349)

A novel, fast, and low-cost method for fabricating large-area arrays of organic-material-based filamentary nanostructures is presented. The technique, auxiliary solvent-based sublimation-aided nanostructuring (ASB-SANS), only takes minutes and exploits a templating matrix easily removable by sublimation. Proof-of-concept patterns fabricated out of poly(methylmethacrylate) (PMMA) and carbon nanotubes (CNTs) are demonstrated.

RP31) A. Fraleoni-Morgera*, M.Tessarolo, A. Perucchi, L. Baldassarre, S. Lupi, B. Fraboni, "Polarized Infrared Studies on Charge Transport in 4-Hydroxycyanobenzene Single Crystals", *J. Phys. Chem. C*, 2012, 116, 2563–2569 (IF 2012: 4.814)

4-Hydroxycyanobenzene (4HCB) semiconducting single crystals have been probed by polarized IR radiation under various conditions. Linearly polarized IR spectroscopy was found to be sufficient to identify the main crystal axes, provided that crystallographic and electrical analyses have been carried out at least once on the crystal. Moreover, a 2D anisotropic hydrogen bonding degree, which results to be higher along the axis a (one of the two planar axes), has been found. Static electrical polarization induces a rather large and anisotropic rotation of the 3D electric dipole vector of the crystal (p -), which increases its component along the axis a and decreases the one along b (the other planar axis). When the crystal is probed under actual charge transport conditions in a field effect transistor (FET) structure, the IR radiation is more effectively screened along axis a (which presents the highest carrier mobility) than along axis b.

RP32) B. Fraboni, A. Ciavatti, F. Merlo, L. Pasquini, A. Cavallini, A. Quaranta, A. Bonfiglio, A. Fraleoni-Morgera, "Organic semiconducting single crystals as next generation of low-cost, room-temperature electrical X-ray detectors", *Adv. Mater.*, 2012, 24 2289-2293 (IF 2012: 14.829)

Direct, solid-state X-ray detectors based on organic single crystals are shown to operate at room temperature, in air, and at voltages as low as a few volts (see figure), delivering a stable and reproducible linear response to increasing X-ray dose rates, with notable radiation hardness and resistance to aging. All-organic and optically transparent devices are reported.

RP33) E. Capria,L. Benevoli, A. Perucchi, B. Fraboni, M. Tessarolo, S. Lupi, and A. Fraleoni-Morgera*, "Infrared Investigations of 4-Hydroxycyanobenzene Single Crystals", *J. Phys. Chem. A* 2013, 117, 6781−6788 (IF 2012: 2.771)

4-Hydroxycyanobenzene (4HCB) single crystals (SCs) and polycrystals (PCs) have been analyzed by means of both unpolarized and linearly polarized (LP) infrared (IR) beams. Most of the signals found at room temperature (298 K) were assigned to well-defined vibrational modes. Using an LP-IR beam and keeping the beam polarization aligned with either the a or the b crystal axis, anisotropic spectra of SCs were also attributed. The differences between the LP and unpolarized spectra of SCs are discussed in view of spatially anisotropic vibronic couplings between the benzenic Ī€ electrons and the molecular functional groups (FGs), with reference to the overall lattice arrangement and the polarizability of the FGs. In addition, signals suggesting the low-concentration presence of tautomers within the crystal were detected. LP-IR measurements of SCs in the temperature range between 298 and 120 K are also reported and discussed, with particular reference to the hydrogen-bonding- related functional groups of 4HCB, allowing the assignment of OH bending signals that were otherwise not clearly attributable and the inference of an anisotropic shrinking of the crystals. Overall, the presented results show that LP-IR spectroscopy is a valuable tool for noncontact, nondestructive characterization of organic semiconducting single crystals.

RP34) L. D'Arsiό, M. Fanetti, C. Cepek, L. Casalis, P. Parisse, L. Gregoratti, M. Amati, G. Di Santo, E. Capria, A. Fraleoni-Morgera, E. Nicolini, A. Goldoni, "Tubular Sn-filled carbon nanostructures on ITO: Nanocomposite material for multiple applications", *Carbon*, 2013, 65, 13-19 (IF 2013: 6.160)

Hollow carbon nanostructures filled by metallic Sn were fabricated by means of chemical vapor deposition on transparent Indium Tin Oxide (ITO). We found no need for catalytic particles, and the growth happens in the temperature range 820-940 K. Upon annealing in an oxygen atmosphere, the carbon skin could be burned out, leaving SnOx pillars on the ITO substrate. The electrical and optical properties of the grown

Sn/C and SnOx nanopillars were characterized. This growth strategy is versatile and can suitably be adapted to different substrate materials, provided that ITO can be deposited and annealed at the temperature required for the formation of the nanostructures. The rational control of this simple growth process and the lack of deposited external catalysts allow the fabrication of ordered, possibly, vertically aligned nanopillars over large areas, with tunable morphological, electrical and optical characteristics. This approach is envisaged as a promising path to develop energy generation and storage electrodes or chemical sensors with improved efficiency.

RP35) A. Fraleoni-Morgera,* G. Palma, J. R. Plaisier, "Fast fabrication over large areas of P3HT nanostructures with high supramolecular order", *RSC Adv.*, **2013**, 3, 15664-15669 (IF 2013: 3.708)

The fabrication of P3HT nanopatterns (lamellae and fibres) within a few minutes, in standard laboratory conditions (i.e., at room temperature and in air) and over areas as large as cm2, is reported. The nanostructures are prepared using a wet-processing method. A satisfactory control over the pattern topology (lamellae, hierarchically connected and parallel fibres, entangled but disconnected and quasi-parallel fibres, randomly oriented fibres) is obtained by simply changing one process parameter. UV-vis spectroscopy and X-ray diffraction analyses carried out over the so-fabricated structures evidence a very high degree of supramolecular organization of the polymeric chains. Such a degree of order is similar or even better than that of P3HT samples treated with thermal or solvent annealing procedures.

RP36) B. Fraboni, A. Ciavatti, L. Basirico', A. Fraleoni-Morgera, "Organic semiconducting single crystals as solid-state sensors for ionizing radiation", *Faraday Disc.*, **2014**, 174, 219-234 (IF 2014=4.606)

So far, organic semiconductors have been mainly proposed as detectors for ionizing radiation in the indirect conversion approach, i.e. as scintillators, which convert ionizing radiation into visible photons, or as photodiodes, which detect visible photons coming from a scintillator and convert them into an electrical signal. The direct conversion of ionizing radiation into an electrical signal within the same device is a more effective process than indirect conversion, since it improves the signal-to-noise ratio and it reduces the device response time. We report here the use of Organic Semiconducting Single Crystals (OSSCs) as intrinsic direct ionizing radiation detectors, thanks to their stability, good transport properties and large interaction volume. Ionizing radiation X-ray detectors, based on low-cost solution-grown OSSCs, are here shown to operate at room temperature, providing a stable linear response with increasing dose rate in the ambient atmosphere and in high radiation environments.

RP37) S. Cacovich, G. Divitini, E. Capria, A. Fraleoni-Morgera, V. Lughi, C. Ducati, "Nanoscale characterisation of hybrid photovoltaic cells based on C 61 capped CdSe QDs", *J. Phys. Conf. Series*, **2014**, 1, 12071 (IF not available)

Hybrid solar cells based on 1,2 methanofullerene (C61) capped CdSe and poly (3-hexylthiophene) (P3HT) were been investigated through a range of techniques. High resolution transmission electron microscopy (HRTEM) was used to characterize size, morphology and crystal structure of as-grown and C 61-capped CdSe quantum dots. Cross sectional lamellar specimens were prepared from full photovoltaic devices using a focused ion beam milling approach. The sections were analysed by high angle annular dark field imaging in scanning TEM mode to determine the morphology of the device, in particular the intermixing of P3HT and capped quantum dots.

RP38) G. Olivieri, A. Cossaro, E. Capria, L. Benevoli, M. Coreno, M. De Simone, K. C. Prince, G. Kladnik, D. Cvetko, B. Fraboni, A. Morgante, L. Floreano, A. Fraleoni-Morgera*, "Intermolecular Hydrogen Bonding and Molecular Orbital Distortion in 4-Hydroxycyanobenzene Investigated by X-ray Spectroscopy", *J. Phys. Chem. C*, **2015**, 119, 121-129 (I.F. 2015=4.509)

Electronic structure of 4-hydroxycyanobenzene in the gas phase, thick films, and single crystals has been investigated by X-ray photoemission spectroscopy (XPS) and near edge X-ray absorption fine structure spectroscopy (NEXAFS). We have used resonant photoemission spectroscopy (RESPES) to identify the symmetry and atomic localization of the occupied and unoccupied molecular orbitals for the free molecule. Upon condensation into a thick film, we find XPS energy shifts in opposite directions for the oxygen and nitrogen core levels, consistent with the formation of an intermolecular hydrogen bond. This interaction is also accompanied by a significant spatial distortion of the lowest unoccupied molecular orbital that is displaced from the nitrogen atom, as indicated by the RESPES measurements. Thick films and single crystals display the same dichroism in polarization dependent NEXAFS, indicating that the intermolecular hydrogen bonding also steers the molecular assembly into a preferred molecular orientation.

RP39) G. Palma, L. Cozzarini, E. Capria, A. Fraleoni-Morgera*, "A home-made system for IPCE measurement of standard and dye-sensitized solar cells", *Rev. Sci. Instrum.*, **2015**, 86, 013112 (IF 2015=1.336)

A home-made system for incident photon-to-electron conversion efficiency (IPCE) characterization, based on a double-beam UV-Vis spectrophotometer, has been set up. In addition to its low cost (compared to the commercially available apparatuses), the double-beam configuration gives the advantage to measure, autonomously and with no need for supplementary equipment, the lamp power in real time, compensating possible variations of the spectral emission intensity and quality, thus reducing measurement times. To manage the optical and electronic components of the system, a custom software has been developed. Validations carried out on a common silicon-based photodiode and on a dye-sensitized solar cell confirm the possibility to adopt this system for determining the IPCE of solar cells, including dye-sensitized ones.

RP40) A. Fraleoni Morgera, V. Lughi, "Frontiers of photovoltaic technology: A Review", *IEEE Xplore*, **2015**, 115-121, DOI: 10.1109/ICCEP.2015.7177610 (IF not available)

As photovoltaics (PV) cost reduction driven by economies of scale is approaching a limit, technological breakthroughs are likely to become again the next driver for further growth. In this paper, we review the most significant photovoltaic (PV) device technologies. First, commercially available cells and modules are briefly surveyed, focusing on the innovations that have recently reached the market, both in silicon-based and thin-film devices. We then identify some significant pre-market technologies such as organic PV and dye-sensitized solar cells, outlining the advantages as well as the obstacles that still hinder large-scale commercialization. A critical review is finally presented for the most promising approaches and some emerging technologies currently under investigation for simultaneously meeting the three key objectives in PV research, all aiming at further reducing the cost per kWh: low fabrication cost, systems integration, and overcoming the standard limit for photoconversion efficiency. All approaches heavily rely on nanotechnology, as the key mechanisms involved in PV conversion occur at the nanoscale.

RP41) L. Basiricò, A. Ciavatti, M. Sibilia, A. Fraleoni-Morgera, S. Trabattoni, A. Sassella, B. Fraboni, "Solid State Organic X-Ray Detectors Based on Rubrene Single Crystals", IEEE Trans. Nucl. Sci., **2015**, 62, 1791-1797 (IF 2015=1.198)

In this work we report the results on the investigation of rubrene single crystals as solid state direct ionizing radiation detectors. With the aim to understand how electrical properties, and in particular a large charge carrier mobility, affect the radiation detection process in organic semiconducting single crystals, we compare the detection performance of rubrene-based devices with those of 1,5-dinitronaphthalene (DNN)-based ones. DNN has been recently proven to be a stable and reliable X-ray direct detector, operating at very low voltages, in air and at room temperature, with a carrier mobility values about two orders of magnitude lower than rubrene. We demonstrate here that the large charge carrier mobility of rubrene crystals does not result in a better X-rays detection performance. In fact, rubrene devices are shown to be less performing than DNN as detectors, with lower sensitivity to X-rays, poorer stability and reproducibility, and longer rise and decay times of the signal.

RP42) A. Ciavatti, E. Capria, A. Fraleoni-Morgera, G. Tromba, D. Dreossi, P. J. Sellin, P. Cosseddu, A. Bonfiglio, B. Fraboni, "Toward Low-Voltage and Bendable X-Ray Direct Detectors Based on Organic Semiconducting Single Crystals", *Adv. Mater.*, **2015**, 27, 7213–7220 (IF 2015=18.32)

Solution-grown organic semiconducting single crystals are robust and easy to handle materials that can reliably detect X-rays in the direct approach, operating at room temperature and in air, providing a linear response to increasing X-ray dose rates. Crystals only a few tens of micrometers thick thus grant a full photogenerated charge collection and this opens the possibility to integrate radiation detectors based on organic crystals into bendable and potentially even flexible electronic devices, exploiting the enhanced flexibility of thin crystals and the recently reported possibility to cover large areas with inkjet printed single crystalline thin films. Device geometries that maximize the electrode/semiconductor interface active area allow to significantly increase the charge collection efficiency and the X-ray electrical photoresponse of 4HCB single crystals. The reported sensitivity of 4HCB-based detectors is in line with that of state-of-the-art a-Se based detectors.

RP43) E. Viviani, S. Dal Zilio, C. Bertoni, A. Fraleoni-Morgera*, "Nanostructured P3HT layers fabricated by self-assembly as promising gas sensors", *IEEE Xplore*, **2015**, 385-388, DOI: 10.1109/PRIME.2015.7251416 (IF not available)

Nanostructured materials for sensors and transducers are of great interest to the scientific community due to several advantages that these materials can provide (e.g., integration with large scale manufacturing technologies, enhanced performances, etc.). Nonetheless, large-area, low-cost and fast processing technologies for creating effective sensing nanostructures are still sought for. In this work, a recently described technique called Auxiliary Solvent-Based Sublimation-Aided NanoStructuring (ASB-SANS) has been used to generate poly(3-hexylthiophene) (P3HT, a well known semiconducting polymer) nanofilamentary structures onto interdigitated electrodes. These have been tested as gas sensing layers for volatile organic compounds, delivering promising results.

RP44) E. Viviani, C. Bertoni, S. Dal Zilio, A. Fraleoni-Morgera*, "Low-cost and fast wet-based technique to generate nanostructured organic materials layers and its application to chemiresistive gassensing devices", *Procedia Engineer.*, **2015**, 120, 1166–1169 (IF not available)

Poly(3-hexylthiophene) (P3HT) nanofibers fabricated by self-assemby have been used as active sensing layers in chemiresistive gas sensors for acetone, ammonia and water. Their response has been compared to that of analogous devices in which P3HT was present as a plain, non-nanostructured layer. The results of this comparison show that nanofiber-based sensors have faster signal decay times and complete baseline recovery even after being exposed to saturated vapors of the analytes. Moreover, the current response of nanofiber-based devices increases by one order of magnitude or more upon exposure to the analyte, while for plain layers this increase is about 50% at maximum. Finally, on the basis of the collected data, a correlation between the analyte polarizability and the 90% baseline recovery times seems to exist, likely due to the occurrence of just physical adsorption (and not also of vapor penetration) of the analyte onto the polymer surface.

RP45) A. Fraleoni-Morgera*, V. Lughi, "Overview of Small Scale Electric Energy Storage Systems suitable for dedicated coupling with Renewable Micro Sources", *IEEE XPlore*, **2015**, http://dx.doi.org/10.1109/ICRERA.2015.7418653 (IF not available)

Renewable Micro Sources (RENMSs) will strongly contribute to the accelerating electrification trend currently ongoing. Furthermore, the upcoming mass electrification of automotive, with the related pulverized, but numerically important, electricity storage potential, suggests to start considering how to guarantee a stable and sustainable grid power. In this frame, it is interesting to consider the possibility to couple to each RENMS a dedicated Small Scale Electrical Energy Storage System (SS-EESS), so to be able to dispatch out of the RENMS a grid-compliant RENMS-produced power. An overview of SS-EESSs is hence hereby given, under the points of view of their current main technical features and their prospected costs. It is found that mechanical-based systems like Small Scale Compressed Energy Storage and Flywheels are interesting options for RENMS/SS-EESS dedicated coupling, although fast technological progress in the field of SS-EESSs and the emergence of a clear trend towards joining more energy storage principles (like batteries-supercapacitors assemblies) will likely change the landscape of this field in the next years. In this view, further studies over dedicated coupling of SS-EESSs and RENMSs could help to avoid difficulties in dealing with exploding electricity storage problems in the next years.

RP46) B. Fraboni, A. Fraleoni-Morgera, N. Zaitseva, "Ionizing Radiation Detectors Based on Solution-Grown Organic Single Crystals", *Adv. Funct. Mater.*, **2016**, 26, 2276–2291 (Review Paper, IF 2016=12.12)

Organic single crystals (OSCs) have ideal qualities (well defined structure and morphology, lack of grain boundaries, high purity, 3D long range order, good electronic transport properties) for several technological applications, in particular as key components for electronic devices. It is only recently that OSCs have been considered as ionizing radiation detectors, and the latest developments in this field are here reported. In the first section, various methods for OSC growth are described, with emphasis on cost-effective, solution-based approaches capable of delivering large volume, well performing crystals. The second section is focused on the use of solution-grown OSCs as scintillators (i.e., as high energy photon to UV-vis photon conversion), highlighting the ability of cm-scale OSCs to effectively detect neutrons and to carry out neutrons-gamma pulse-shape discrimination tasks. Finally, the third section describes the use of semiconducting, solution-grown OSCs as effective solid state direct detectors (i.e., directly converting high energy photons into charge carriers), evidencing extremely promising performances in terms of operability in environmental conditions (i.e., no need for encapsulation), radiation hardness, linear response and low operating voltage. The latest developments in the application of organic single crystals (OSCs) as ionizing radiation detectors, both as scintillators and as solid state direct detectors, are reviewed. Properties of OSCs relevant to this task are discussed together with the most effective and convenient methods for their growth.

RP47) B. Fraboni, A. Fraleoni-Morgera, Y. Geerts, A. Morpurgo, V. Podzorov, "Organic single crystals: An essential step to new physics and higher performances of optoelectronic devices", *Adv. Funct. Mater.*, **2016**, 26, 2229-2232 (IF 2016=12.12)

The interest in organic single crystals has been further boosted by the development of both solution-growth processes and molecular structures specifically tailored for achieving enhanced solubilities. The synergy between these features allows for the growth of single crystals of both p- or n-type, in some cases even directly on patterned electrodes. The organic field effect transistor (OFET) occupies a predominant role among the various organic electronic devices that can be realized based on single crystals.

RP48) J. Mohanraj, L. Puzzi, E. Capria, S. Corvaglia, L. Casalis, L. Mestroni, O. Sbaizero, A. Fraleoni-Morgera*, "Easy fabrication of aligned PLLA nanofibers-based 2D scaffolds suitable for cell contact guidance studies", *Mater. Sci. Eng. C.*, 2016, 62, 301-306 (IF 2016=4.164)

An easy, low-cost and fast wet processing-based method named ASB-SANS (Auxiliary Solvent-Based Sublimation-Aided NanoStructuring) has been used to fabricate poly(l-lactic acid) (PLLA) highly ordered and hierarchically organized 2D fibrillar patterns, with fiber widths between 40 and 500 nm and lengths exceeding tens of microns. A clear contact guidance effect of these nanofibrillar scaffolds with respect to HeLa and NIH-3T3 cells growth has been observed, on top of an overall good viability. For NIH-3T3 pronounced elongation of the cells was observed, as well as a remarkable ability of the patterns to guide the extension of pseudopodia. Moreover, SEM imaging revealed filopodia stemming from both sides of the pseudopodia and aligned with the secondary PLLA nanofibrous structures created by the ASB-SANS procedure. These results validate ASB-SANS as a technique capable to provide biocompatible 2D nanofibrillar patterns suitable for studying phenomena of contact guidance (and, more in general, the behavior of cells onto nanofibrous scaffolds), at very low costs and in an extremely easy way, accessible to virtually any laboratory.

RP49) A. Ciavatti, P J. Sellin, L. Basiricò, A. Fraleoni-Morgera, B. Fraboni, "Charged-particle spectroscopy in organic semiconducting single crystals", *Appl. Phys. Lett.*, 2016, 15, 153301 (IF 2016=3.411)

The use of organic materials as radiation detectors has grown, due to the easy processability in liquid phase at room temperature and the possibility to cover large areas by means of low cost deposition techniques. Direct charged-particle detectors based on solution-grown Organic Semiconducting Single Crystals (OSSCs) are shown to be capable to detect charged particles in pulse mode, with very good peak discrimination. The direct charged-particle detection in OSSCs has been assessed both in the planar and in the vertical axes, and a digital pulse processing algorithm has been used to perform pulse height spectroscopy and to study the charge collection efficiency as a function of the applied bias voltage. Taking advantage of the charge spectroscopy and the good peak discrimination of pulse height spectra, an Hecht-like behavior of OSSCs radiation detectors is demonstrated. It has been possible to estimate the mobility-lifetime value in organic materials, a fundamental parameter for the characterization of radiation detectors, whose results are equal to Î¼Ï„coplanar = (5 .5 Å± 0.6) Ã— 10-6 cm2/V and Î¼Ï„sandwich = (1 .9 Å± 0.2) Ã— 10-6 cm2/V, values comparable to those of polycrystalline inorganic detectors. Moreover, alpha particles Time-of-Flight experiments have been carried out to estimate the drift mobility value. The results reported here indicate how charged-particle detectors based on OSSCs possess a great potential as low-cost, large area, solid-state direct detectors operating at room temperature. More interestingly, the good detection efficiency and peak discrimination observed for charged-particle detection in organic materials (hydrogen-rich molecules) are encouraging for their further exploitation in the detection of thermal and high-energy neutrons.

RP50) I. H. Eryilmaz. J. Mohanraj, S. Dal Zilio, A. Fraleoni-Morgera*, "Controlled self-organization of polymer nanopatterns over large areas", *Sci. Rep.*, 2017, 7, 10526 (IF 2017: 4.122)

Self-assembly methods allow to obtain ordered patterns on surfaces with exquisite precision, but often lack in effectiveness over large areas. Here we report on the realization of hierarchically ordered polymethylmethacrylate (PMMA) nanofibres and nanodots over large areas from solution via a fast, easy and low-cost method named ASB-SANS, based on a ternary solution that is cast on the substrate. Simple changes to the ternary solution composition allow to control the transition from nanofibres to nanodots, via a wide range of intermediate topologies. The ternary solution includes the material to be patterned, a liquid solvent and a solid substance able to sublimate. The analysis of the fibres/dots width and inter-pattern distance variations with respect to the ratio between the solution components suggests that the macromolecular chains mobility in the solidified sublimating substance follows Zimm-like models (mobility of macromolecules in diluted liquid solutions). A qualitative explanation of the self-assembly phenomena originating the observed nanopatterns is given. Finally, ASB-SANS-generated PMMA nanodots arrays have been used as lithographic masks for a silicon substrate and submitted to Inductively Coupled Plasma-Reactive Ion Etching (ICP-RIE). As a result, nanopillars with remarkably high aspect ratios have been achieved over areas as large as several millimeters square, highlighting an interesting potential of ASB-SANS in practical applications like photon trapping in photovoltaic cells, surface-enhanced sensors, plasmonics.

RP51) G. Pipan, M. Bogar. A. Ciavatti, L. Basiricò, T. Cramer, B. Fraboni, A. Fraleoni-Morgera*, "Direct inkjet printing of TIPS-Pentacene single crystals onto interdigitated electrodes by chemical confinement", *Adv. Mater. Interfaces*, 2017, 1700925 (IF 2017: 4.834)

Organic semiconducting single crystals (OSSCs) are very promising for low-cost electronics, being the highest performers among organic semiconductors in terms of charge transport, with carrier mobilities exceeding 10 cm2 V sâ¯1. Here, it is demonstrated how it is possible to obtain millimeter-long single crystals of 6,13-bis(triisopropylsilylethynyl)pentacene (TIPS-pentacene) onto gold interdigitated electrodes patterned onto flexible plastic substrates, via direct inkjet printing of precursor solutions. This result is enabled by a

novel chemical confinement strategy that exploits fluorinated thiols as solvophobic â€œchemical fencesâ€ , able to avoid the printed solution spreading, thus promoting the formation of single crystals even on highly heterogeneous surfaces, without changing the chemical nature of the surface underlying the grown crystals. Electrical measurements demonstrate a good electrical contact with the electrodes. Moreover, their response UV-vis (Ultraviolet-visible) is among the highest up to now reported for organic UVâ€“vis photodetectors, and their performance as direct X-ray detectors is satisfactory, confirming that the printed crystals have an effective electrical contact with the underlying electrodes. Since both the solvophobic fence and the TIPS crystals precursor solution are inkjet printed on flexible substrates, this work opens novel perspectives for the practical use of OSSCs in low cost, yet performing, flexible electronics.

RP52) J. Mohanraj, E. Capria, L. Benevoli, A. Perucchi, N. Demitri, A. Fraleoni-Morgera*, "XRD- and infrared-probed anisotropic thermal expansion properties of an organic semiconducting single crystal", *Phys. Chem. Chem. Phys.*, 2018 20, 1984-1992 (IF 2017: 3.906)

The anisotropic thermal expansion properties of an organic semiconducting single crystal constituted by 4-hydroxycyanobenzene (4HCB) have been probed by XRD in the range 120-300 K. The anisotropic thermal expansion coefficients for the three crystallographic axes and for the crystal volume have been determined. A careful analysis of the crystal structure revealed that the two different H-bonds stemming from the two independent, differently oriented 4HCB molecules composing the unit cell have different rearrangement patterns upon temperature variations, in terms of both bond length and bond angle. Linearly Polarized Mid InfraRed (LP-MIR) measurements carried out in the same temperature range, focused on the O-H bond spectral region, confirm this finding. The same LP-MIR measurements, on the basis of a semi-empirical relation and of geometrical considerations and assumptions, allowed calculation of the-CNâ€¯H-O-hydrogen bond length along the a and b axes of the crystal. In turn, the so-calculated-CNâ€¯H-O-bond lengths were used to derive the thermal expansion coefficients along the corresponding crystal axes, as well as the volumetric one, using just the LP-MIR data. Reasonable to good agreement with the same values obtained from XRD measurements was obtained. This proof-of-principle opens interesting perspectives about the possible development of a rapid, low cost and industry-friendly assessment of the thermal expansion properties of organic semiconducting single crystals (OSSCs) involving hydrogen bonds.

RP53) E. Di Bernardo, A. Fraleoni-Morgera*, A. Iannello, L. Toneatti, D. Pozzetto, "Economical analysis of alternative uses of biogas produced by an anaerobic digestion plant", Int. J. Environ. Res., 2019, 13, 199 (IF 2017: 1.019)

In the frame of the Italian market and regulations, some alternative uses of biogas produced by an anaerobic digestion plant fuelled by zootechnical effluents, integrated with corn silage, are investigated. In particular, on the basis of an existing plant, the following alternatives to the use of the generated biogas are analyzed and compared under the economical point of view:
use of a cogeneration plant to produce electric energy (self-consumption and sale of the surplus to the power supply network operator) and thermal energy (digester and post-digester heating, and feeding of a cereal dryer);
use of a trigeneration plant to produce electric energy (self-consumption and sale of the surplus to the power supply network operator) and thermal/refrigeration energy (heating of the digester and post-digester, and air conditioning of the company's warehouses);
use of a regenerative water-based scrubbing plant for up-grading the quality of the produced biogas, obtaining biomethane for direct sale to the network operator.
This comparison is carried out considering the technical differences between the three alternatives, as well as the related investment and operative costs. A sensitivity analysis on the main parameters influencing the payback time of the three alternatives has been also carried out, showing that the most important parameter to consider is the cost of energy (as either electric or biomethane vector). On these grounds, using the Net Present Value approach, an assessment of the most convenient option in terms of shortest payback time and highest returns is made.

RP54) A. Fraleoni-Morgera*, M. Chhikara, "Polymer-based nano-composites for thermal insulation", Adv. Eng. Mater., 2019, 1801162 (IF 2017: 2.576)

The growing need for efficient energy use prompts for effective thermally insulating materials. Nano-composites represent an important class of materials able to fulfill these needs, enabling both sizeable energy savings and specific applications where thermal insulation has to be coupled to mechanical robustness and lightness, like in automotive and aerospace.
In view of these developments, this review summarizes the topic of polymer-based nanocomposites for thermal insulation. The theme is introduced overviewing the features of the matrix-filler interfaces and of the available models of thermal conductivity, with a mention of the most used types of polymeric matrices. The main three different types of polymer-based nanocomposites for thermal insulation, i.e. polymeric nano-foams, syntactic foams and all-solid nanocomposites, are then reviewed. For each class of material the thermal insulation performance of selected examples is highlighted, with explicit reference to the material's

structure and constitutional peculiarities (like type or size of the filler, specific filler surface functionalizations, etc). A resuming table reporting the thermal insulation performance of selected composites is also included in the review. Finally, an outlook on the possible developments in the field is given.

RP55) C. Bertoni, P. Nacleno, E. Viviani, S. Dal Zillo, S. Carrato, A. Fraleoni-Morgera*, "Nanostructured P3HT as a Promising Sensing Element for Real-Time, Dynamic Detection of Gaseous Acetone", Sensors, **2019**, 19, 1296 (IF 2017 2.475)

The dynamic response of gas sensors based on poly(3-hexylthiophene) (P3HT) nanofibers (NFs) to gaseous acetone was assessed using a setup based on flow-injection analysis, aimed at emulating actual breath exhalation. The setup was validated by using a commercially available sensor. The P3HT NFs sensors tested in dynamic flow conditions showed satisfactory reproducibility down to about 3.5 ppm acetone concentration, a linear response over a clinically relevant concentration range (3.5-35 ppm), excellent baseline recovery and reversibility upon repeated exposures to the analyte, short pulse rise and fall times (less than 1 s and about 2 s, respectively) and low power consumption (few nW), with no relevant response to water. Comparable responses' decay times under either nitrogen or dry air suggest that the mechanisms at work is mainly attributable to specific analyte-semiconducting polymer interactions. These results open the way to the use of P3HT NFs-based sensing elements for the realization of portable, real-time electronic noses for on-the-fly exhaled breath analysis.

Candidato: Genchi Giada Graziana

1) Laurenti M., Lamberti A., **Genchi G.G.**, Roppolo I., Canavese G., Vitale-Brovarone C., Ciofani G., Cauda V. "*Graphene Oxide Finely Tunes the Bioactivity and Drug Delivery of Mesoporous ZnO Scaffolds*" ***ACS Applied Materials and Interfaces*** ISSN: 19448244, 11(1), 449-456 (2019) DOI: 10.1021/acsami.8b20728.

   IF 2017: 8.097. Citazioni Scopus: 0. Citazioni WoS: 0. Media delle citazioni per anno su WoS: 0.00.

2) **Genchi G.G.**, Ciofani G. "*Smart tools for caring: Nanotechnology meets medical challenges*" ***Frontiers in Bioengineering and Biotechnology*** ISSN: 2296-4185, 7: 11 (2019) DOI: 10.3389/fbioe.2019.00011.

   IF 2017: Non disponibile, ND. Citazioni Scopus: ND. Citazioni WoS: 0. Media delle citazioni per anno su WoS: 0.00.

3) ***Genchi G.G.**, Degl'Innocenti A., Salgarella A.R., Pezzini I., Marino A., Menciassi A., Piccirillo S., Balsamo M., Ciofani G. "*Modulation of gene expression in rat muscle cells following treatment with nanoceria in different gravity regimes*" ***Nanomedicine*** ISSN: 17435889, 13(22), 2821-2833 (2018) DOI: 10.2217/nnm-2018-0316.

   IF 2017: 5.005. Citazioni Scopus: 1. Citazioni WoS: 1. Media delle citazioni per anno su WoS: 0.50. Anni decorsi dalla pubblicazione: 0.50.

   Contributo della candidata: ideazione esperimenti; caratterizzazione e stabilizzazione proprietà colloidali dispersioni nanoparticelle; coltura cellulare; analisi trascrizionale; scrittura articolo.

4) ***Genchi G.G.**, Sinibaldi E., Ceseracciu L., Labardi M., Marino A., Marras S., De Simoni G., Mattoli V., Ciofani G. "*Ultrasound-activated piezoelectric P(VDF-TrFE)/boron nitride nanotube composite films promote differentiation of human SaOS-2 osteoblast-like cells*" ***Nanomedicine: Nanotechnology, Biology, and Medicine*** ISSN: 15499634, 14 (7), 2421-2432 (2018) DOI: 10.1016/j.nano.2017.05.006.

   IF 2017: 6.500. Citazioni Scopus: 7. Citazioni WoS: 5. Media delle citazioni per anno su WoS: 2.50. Anni decorsi dalla pubblicazione: 0.58.

   Contributo della candidata: ideazione esperimenti; preparazione nanocompositi; microscopia elettronica a scansione; coltura cellulare; stimolazione ultrasonica; immunocitochimica; microscopia a fluorescenza; analisi trascrizionale; scrittura articolo.

5) **Genchi G.G.**, Marino A., Tapeinos C., Ciofani G. "*Smart materials meet multifunctional biomedical devices: current and prospective implications for nanomedicine*" ***Frontiers in Biotechnology and Bioengineering*** ISSN: 22964185, 5 (2017), DOI: 10.3389/fbioe.2017.00080.
   IF 2017: ND. Citazioni Scopus: 4. Citazioni WoS: 4. Media delle citazioni per anno su WoS: 1.33.

6) Marino A., **Genchi G.G.**, Mattoli V., Ciofani G. "*Piezoelectric nanotransducers: The future of neural stimulation*" ***Nano Today*** ISSN: 17480132, 14, 9-12 (2017) DOI: 10.1016/j.nantod.2016.12.005.

IF 2017: 17.753. Citazioni Scopus: 8. Citazioni WoS: 8. Media delle citazioni per anno su WoS: 2.67.

7) Marino A, **Genchi G.G.**, Sinibaldi E., Ciofani G. "*Piezoelectric Effects of Materials on Biointerfaces*" ***ACS Applied Materials and Interfaces*** ISSN: 19448244, 9(21), 17663-17680 (2017) DOI: 10.1021/acsami.7b04323.

IF 2017: 8.097. Citazioni Scopus: 11. Citazioni WoS: 13. Media delle citazioni per anno su WoS: 4.33.

8) Marino A, Tonda-Turo C., De Pasquale D., Ruini F., **Genchi G.G.**, Nitti S., Cappello V., Gemmi M., Mattoli V., Ciardelli G., Ciofani G. "*Gelatin/nanoceria nanocomposite fibers as antioxidant scaffolds for neuronal regeneration*" ***Biochimica et Biophysica Acta (BBA) - General Subjects*** ISSN: 03044165, 1861(2) 386-395 (2017) DOI: 10.1016/j.bbagen.2016.11.022.

IF 2017: 3.679. Citazioni Scopus: 16. Citazioni WoS: 13. Media delle citazioni per anno su WoS: 4.33.

9) ***Genchi G.G.**, Marino A., Grillone A., Pezzini I., Ciofani G. "*Remote Control of Cellular Functions: The Role of Smart Nanomaterials in the Medicine of the Future*" **Advanced Healthcare Materials** ISSN: 21922640, 6(9), 1700002 (2017) Back Cover, DOI: 10.1002/adhm.201700002.

IF 2017: 5.609. Citazioni Scopus: 6. Citazioni WoS: 6. Media delle citazioni per anno su WoS: 2.00. Anni decorsi dalla pubblicazione: 1.92.

Contributo della candidata: scrittura dell'introduzione e del paragrafo sui materiali piezoelettrici; revisione dell'intero manoscritto.

10) ***Genchi G.G.**, Ceseracciu L., Marino A., Labardi M., Marras S., Pignatelli F., Bruschini L., Mattoli V., Ciofani G. "*P(VDF-TrFE)/BaTiO$_3$ Nanoparticle Composite Films Mediate Piezoelectric Stimulation and Promote Differentiation of SH-SY5Y Neuroblastoma Cells*" ***Advanced Healthcare Materials*** ISSN: 21922640, 5(14), 1808-1820 (2016) DOI: 10.1002/adhm.201600245.

IF 2016: 5.110. Citazioni Scopus: 23. Citazioni WoS: 22. Media delle citazioni per anno su WoS: 5.50. Anni decorsi dalla pubblicazione: 2.75.

Contributo della candidata: ideazione esperimenti; preparazione dispersioni/film omogenei nanocompositi; microscopia elettronica a scansione; calorimetria differenziale a scansione; coltura cellulare; stimolazione ultrasonica; immunocitochimica; analisi immagini; scrittura articolo.

11) ***Genchi G.G.**, Marino A., Rocca A., Mattoli V., Ciofani G. "*Barium titanate nanoparticles: Promising multitasking vectors in nano medicine*" ***Nanotechnology*** ISSN: 09574484, 27(23), 232001 (2016) DOI: 10.1088/0957-4484/27/23/232001.

IF 2016: 3.440. Citazioni Scopus: 17. Citazioni WoS: 16. Media delle citazioni per anno su WoS: 4.00. Anni decorsi dalla pubblicazione: 2.83.

Contributo della candidata: scrittura dei paragrafi sulla sintesi e sulle proprietà ottiche non lineari di nanoparticelle di titanato di bario; revisione dell'intero manoscritto.

12) ***Genchi G.G.**, Nuhn H., Liakos I., Marino A., Marras S., Athanassiou A., Mattoli V., Desai T.A. "*Titanium dioxide nanotube arrays coated with laminin enhance C2C12 skeletal myoblast adhesion and differentiation*" **RSC Advances** ISSN: 20462069, 6(22), 18502-18514 (2016) DOI: 10.1039/c6ra00716c.

IF 2016: 3.108. Citazioni Scopus: 1. Citazioni WoS: 1. Media delle citazioni per anno su WoS: 0.25. Anni decorsi dalla pubblicazione: 3.25.

Contributo della candidata: ideazione esperimenti; sintesi elettrochimica array; microscopia elettronica; analisi spettri XPS; modificazione superficiale; coltura cellulare; immunocitochimica; microscopia a fluorescenza confocale; analisi immagini; scrittura articolo.

13) **Genchi G.G.**, Rocca A., Marino A., Grillone A., Mattoli V., Ciofani G. "*Hypergravity As a Tool for Cell Stimulation: Implications in Biomedicine*" ***Frontiers in Astronomy and Space Sciences*** ISSN: 2296-987X, 3, 26 (2016) DOI: 10.3389/fspas.2016.00026.

IF 2016: ND. Citazioni Scopus: ND. Citazioni WoS: 4. Media delle citazioni per anno su WoS: 1.00.

14) **Genchi G.G.**, Ciofani G. "*Bioapplications of boron nitride nanotubes*" ***Nanomedicine*** ISSN: 17435889, 10(22), 3315-3319 (2015) DOI: 10.2217/nnm.15.148.

IF 2015: 4.889. Citazioni Scopus: 10. Citazioni WoS: 10. Media delle citazioni per anno su WoS: 2.00.

15) Mele E., Heredia-Guerrero J.A., Bayer I.S., Ciofani G., **Genchi G.G.** (...), Athanassiou A. "*Zwitterionic Nanofibers of Super-Glue for Transparent and Biocompatible Multi-Purpose Coatings*" ***Scientific Reports*** ISSN: 20452322, 5, 14019 (2015), DOI: 10.1038/srep14019.

IF 2015: 5.228. Citazioni Scopus: 16. Citazioni WoS: 17. Media delle citazioni per anno su WoS: 3.40.

16) **Genchi G.G.**, Cialdai F., Monici M., Mazzolai B., Mattoli V., Ciofani G. "*Hypergravity stimulation enhances PC12 neuron-like cell differentiation*" ***BioMed Research International*** ISSN: 23146133, 748121 (2015) DOI: 10.1155/2015/748121.

IF 2015: 2.134. Citazioni Scopus: 20. Citazioni WoS: 11. Media delle citazioni per anno su WoS: 2.20.

17) ***Genchi G.G.**, Ciofani G., Polini A., Liakos I., Iandolo D., Athanassiou A., Pisignano D., Menciassi A., Mattoli V. "*PC12 neuron-like cell response to electrospun poly(3-hydroxybutyrate) substrates*", ***Journal of Tissue Engineering and Regenerative Medicine*** ISSN: 19326254, 9(2), 151-161 (2015) DOI: 10.1002/term.1623.

IF 2015: 4.710. Citazioni Scopus: 15. Citazioni WoS: 15. Media delle citazioni per anno su WoS: 3.00. Anni decorsi dalla pubblicazione: 4.16.

Contributo della candidata: ideazione esperimenti, caratterizzazione substrati: microscopia elettronica a scansione e misure bagnabilità; colture cellulari; spettrofluorimetria; immunocitochimica; microscopia a fluorescenza; analisi immagini; analisi statistica; scrittura articolo.

18) Marino A., Filippeschi C., **Genchi G.G.**, Mattoli V., Mazzolai B., Ciofani G. "*The Osteoprint: a Bio-Inspired Two-Photon Polymerized 3D Structure for the Enhancement of Bone-Like Cell Differentiation*" ***Acta Biomaterialia*** ISSN: 17427061, 10(10), 4304-4313 (2014) DOI: 10.1016/j.actbio.2014.05.032.

IF 2014: 6.025. Citazioni Scopus: 40. Citazioni WoS: 39. Media delle citazioni per anno su WoS: 6.50.

19) Ciofani G., **Genchi G.G.**, Mazzolai B., Mattoli V. "*Transcriptional profile of genes involved in oxidative stress and antioxidant defense in PC12 cells following treatment with cerium oxide nanoparticles*" ***Biochimica et Biophysica Acta- General Subjects*** ISSN: 03044165, 1840(1), 495-506 (2014) DOI: 10.1016/j.bbagen.2013.10.009.

IF 2014: 4.381. Citazioni Scopus: 36. Citazioni WoS: 34. Media delle citazioni per anno su WoS: 5.67.

20) Ciofani G., Genchi G.G., Guardia P., Mazzolai B., Mattoli V., Bandiera A. "*Recombinant human elastin-like magnetic microparticles for drug delivery and targeting*" ***Macromolecular Bioscience*** ISSN: 16165187, 14(5), 632-642 (2014) DOI: 10.1002/mabi.201300361.

IF 2014: 3.851 Citazioni Scopus: 12. Citazioni WoS: 12. Media delle citazioni per anno su WoS: 2.00.

21) *Ciofani G., **Genchi G.G.**, Liakos I., Cappello V., Gemmi M., Athanassiou A., Mazzolai B., Mattoli V. "*Effects of Cerium Oxide Nanoparticles on PC12 Neuronal-Like Cells: Proliferation, Differentiation, and Dopamine Secretion*", ***Pharmaceutical Research*** ISSN: 07248741, 30(8), 2133-2145 (2013) DOI: 10.1007/s11095-013-1071-y.

IF 2017: 3.952. Citazioni Scopus citations: 42. Citazioni WoS: 43. Media delle citazioni per anno su WoS: 6.14. Anni decorsi dalla pubblicazione: 5.67.

Contributo della candidata: ideazione esperimenti; coltura cellulare; spettrofotometria; immunocitochimica; microscopia a fluorescenza, analisi trascrizionale con *reverse transcriptase-polymerase chain reaction*; scrittura articolo.

22) *Ciofani G., Danti S., **Genchi G.G.**, Mazzolai B., Mattoli V. "Boron nitride nanotubes: biocompatibility and potential spill-over in nanomedicine", **Small** ISSN: 16136810, 9(9-10), 1672-1685 (2013) DOI: 10.1002/smll.201201315.

IF 2013: 7.514. Citazioni Scopus: 92. Citazioni WoS: 82. Media delle citazioni per anno su WoS: 11.71. Anni decorsi dalla pubblicazione: 5.92.

Contributo della candidata: scrittura del paragrafo sulle metodologie di funzionalizzazione e sulle applicazioni biomediche dei nanotubi di nitruro di boro; revisione dell'intero manoscritto.

23) ***Genchi G.G.**, Ciofani G., Liakos I., Ricotti L., Ceseracciu L., Athanassiou A., Mazzolai B., Menciassi A., Mattoli V. "*Bio/non-bio interfaces: A straightforward method for obtaining long term PDMS/muscle cell biohybrid constructs*", ***Colloids and Surfaces B: Biointerfaces*** ISSN: 09277765, 105, 144-151 (2013) DOI: 10.1016/j.colsurfb.2012.12.035.

IF 2013: 4.287. Citazioni Scopus: 16. Citazioni WoS: 13. Media delle citazioni per anno su WoS: 1.86. Anni decorsi dalla pubblicazione: 6.25.

Contributo della candidata: ideazione esperimenti; preparazione film siliconici; modificazione superficiale mediante metodi chimici e plasmochimici; caratterizzazione meccanica mediante estensimetria; analisi aging materiale; analisi immagini; scrittura articolo.

24) Ciofani G., **Genchi G.G.**, Liakos I., Athanassiou A., Mattoli V., Bandiera A. "*Human recombinant elastin-like protein coatings for muscle cell proliferation and differentiation*", ***Acta Biomaterialia*** ISSN: 17427061, 9(2), 5111-5121 (2013) DOI: 10.1016/j.actbio.2012.10.016.

IF 2013: 5.684. Scopus citations: 16. Citazioni WoS: 15. Media delle citazioni per anno su WoS: 2.14.

25) Ciofani G., Del Turco S., **Genchi G.G.**, D'Alessandro D., Basta G., Mattoli V., "*Transferrin-conjugated boron nitride nanotubes: Protein grafting, characterization, and interaction with human endothelial cells*", ***International Journal of Pharmaceutics*** ISSN: 03785173, 436 (1–2), 444–453 (2012) DOI: 10.1016/j.ijpharm.2012.06.037.

IF 2012: 3.458. Citazioni Scopus: 26. Citazioni WoS: 24. Media delle citazioni per anno su WoS: 3.00.

26) Ciofani G., **Genchi G.G.**, Mattoli V. "*ZnO nanowire arrays as substrates for cell proliferation and differentiation*" ***Materials Science and Engineering C*** ISSN: 09284931, 32(2): 341-347 (2012) DOI: 10.1016/j.msec.2011.11.001.

IF 2012: 2.404. Citazioni Scopus: 16. Citazioni WoS: 14. Media delle citazioni per anno su WoS: 1.75.

27) *Ciofani G., **Genchi G.G.**, Liakos L, Athanassiou A., Dinucci D., Chiellini F., Mattoli V. "*A Simple Approach to Covalent Functionalization of Boron Nitride Nanotubes*"; ***Journal of Colloid and Interface Science*** ISSN: 00219797, 374(1), 308-314 (2012) DOI: 10.1016/j.jcis.2012.01.049.

IF 2012: 3.172. Citazioni Scopus: 82. Citazioni WoS: 69. Media delle citazioni per anno su WoS: 8.63. Anni decorsi dalla pubblicazione: 6.92.

Contributo della candidata: colture cellulari; spettrofotometria; immunocitochimica; scrittura articolo.

28) *Ciofani G., Danti S., **Genchi G.G.**, D'Alessandro D., Odorico M., Pellequer J., Mattoli V., Giorgi M. "*Pilot in vivo toxicological investigation of boron nitride nanotubes*" ***International Journal of Nanomedicine*** ISSN: 11769114, 7, 19-24 (2012) DOI: 10.2147/IJN.S28144.

IF 2012: 3.463. Citazioni Scopus: 44. Citazioni WoS: 37. Media delle citazioni per anno su WoS: 4.63. Anni decorsi dalla pubblicazione: 7.30.

Contributo della candidata: preparazione delle dispersioni di nanotubi di nitruro di boro, *coating* superficie e microscopia a forza atomica; scrittura articolo.

29) Ricotti L., Polini A., **Genchi G.G.**, Ciofani G., Iandolo D., Vazão H., Mattoli V., Ferreira L., Menciassi A., Pisignano D. "*Proliferation and skeletal myotube formation capability of C2C12 and H9c2 cells on isotropic and anisotropic electrospun nanofibrous PHB scaffolds*" ***Biomedical Materials*** ISSN: 17486041, 7(3): 035010 (2012) DOI: 10.1088/1748-6041/7/3/035010.

IF 2012: 2.174. Citazioni Scopus citations: 54. Citazioni WoS: 48. Media delle citazioni per anno su WoS: 6.00.

Candidato: Madaghiele Marta

1. Sannino A, Madaghiele M, Conversano F, Mele G, Maffezzoli A, Netti PA, Ambrosio L, Nicolais L. Cellulose derivative-hyaluronic acid-based microporous hydrogels crosslinked through divynil sulfone (DVS) to modulate equilibrium sorption capacity and network stability. *Biomacromolecules* 5: 92-96, 2004.
   Numero citazioni=63; Impact Factor=3.299
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