Mariacristina Gagliardi

PhD in Chemical and Materials Engineering

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Current position

03/2018-Nowaday **Research collaborator**, *IMT School for Advanced Studies Lucca.*
Modeling and characterization of aging phenomena in commercial paints.
Used tools: FEM analysis, reaction-diffusion model, FTIR-ATR spectroscopy, glossmetry, MATLAB.
Contract details: Research grant, prot. n. 01443.VII.16 (02/03/2018), from 01/03/2018.
Project details: "Progettazione intelligente di vernici innovative funzionalizzate (PROPAINT)", in collaboration with Cromology Italia S.p.A., POR Regione Toscana FSE 2014/2020.
Referent: Prof. Marco Paggi.

Previous positions

01/2018-02/2018 **Research collaborator**, *IMT School for Advanced Studies Lucca.*
Mathematical modeling of blistering and delamination phenomena in photovoltaic modules, coupling moisture absorption, diffusion and vaporization, adhesion energy change and mechanical phenomena.
Used tools: FEM analysis, reaction-diffusion model, interface fracture mechanics, MATLAB.
Contract details: Fixed-term contract, prot. n. 06924.VII.16 (27/12/2017), from 01/01/2018 to 28/02/2018.
Project details: "Multi-field and multi-scale Computational Approach to design and durability of Photo-Voltaic Modules (CA2PVM)", ERC-2012-StG.
Referent: Prof. Marco Paggi.

11/2015-11/2017 **Postdoctoral researcher**, *IMT School for Advanced Studies Lucca.*
Mathematical modeling of material degradation in photovoltaic modules, involving chemical reactions, decay of mechanical and electrical properties, diffusion of small molecules.
Used tools: FEM analysis, reaction-diffusion model, MATLAB, AutoCAD, electroluminescence.
Contract details: Research grant, prot. n. 03572.VII.16 (30/10/2015) and n. 05331.VII.16 (22/11/2016), from 18/11/2015 to 30/11/2017.
Project details: "Multi-field and multi-scale Computational Approach to design and durability of Photo-Voltaic Modules (CA2PVM)", ERC-2012-StG.
Referent: Prof. Marco Paggi.

11/2013-11/2015 **Postdoctoral researcher**, *Istituto Italiano di Tecnologia, Center for Micro Bio-Robotics @SSSA.*
Development of smart materials with applications in soft robotics and organic electronics. Developed systems: T- and pH-responsive acrylic polymers with tunable mechanical properties; microstructured photo-active films based on PDMS functionalized with spiropyrans; UV-responsive polymers for electric components; polymerizable photoresists based on PDMS and PLGA for Direct Laser Writing.
Used techniques: ROP, RAFT, chemical coupling, thiol-ene click chemistry, replica molding, spiropyran synthesis, NMR, HPLC, GPC, FTIR-ATR, UV-Vis, fluorimetry, DSC, rheometry, SEM, DLS, contact angle.
Contract details: Fixed-term contract, prot. n. 0070864/13 (13/11/2013), from 16/11/2013 to 15/11/2015.
Referent: Prof. Barbara Mazzolai.

11/2011-11/2013 **Postdoctoral researcher**, *Istituto Italiano di Tecnologia, Center for Nanotechnology Innovation @NEST.*
Preparation and characterization of degradable polymeric nanocarriers for controlled drug delivery in the Central Nervous System. Developed systems: nanoparticles obtained by solvent displacement from amphiphilic PLGA-*block*-PEG and PCL-*block*-PEG copolymers; PLGA-based molecularly imprinted degradable nanoparticles. One formulation, based on a newly synthesized amphiphilic copolymer, was patented.
Used techniques: ROP, end-chain functionalization, NMR, HPLC, GPC, FTIR-ATR, UV-Vis, fluorimetry, DSC, SEM, DLS.
Contract details: Fixed-term contract, prot. n. 0050881/11 (03/11/2011), from 16/11/2011 to 15/11/2013, moved to Center for Micro- BioRobotics @SSSA on 16/01/2013, prot. n. 0002644/13 (15/01/2013).
Referent: Prof. Angelo Bifone.

01/2010-11/2011 **Postdoctoral researcher**, *University of Pisa, Dept. of Chemical Engineering, Industrial Chemistry and Materials Science.*
Preparation, characterization (chemical, mechanical, rheological, functional) and functionalization of 3D and injectable degradable biomatrices able to mimic mechanical and topological properties of the health cardiac tissue, and to promote cell colonization and differentiation. Developed systems: 3D membranes and microstructured construct obtained by soft lithography, functionalized with molecularly imprinted particles toward MMP-9; sol-gel solutions based on amphiphilic PCL-*block*-PEG copolymers with LCST close to physiological temperatures. One of the developed formulations was patented.
Used techniques: ROP, radical polymerization, soft lithography, HPLC, GPC, FTIR-ATR, rheometry, DMA, DSC.
Contract details: Research grant, prot. n. 7702 (31/05/2010), from 04/06/2010 to 15/11/2011.
Project details: "Advanced Cardiovascular Therapies (ACTIVE)", P.O.R. F.E.S.R. 2007/2013.
Referent: Prof. Paolo Giusti.

01/2010-06/2010 **Research collaborator**, *University of Pisa, Dept. of Chemical Engineering, Industrial Chemistry and Materials Science.*
Development of polymeric materials for 3D and injectable scaffolds for myocardial tissue engineering mimicking topological and mechanical properties of biological health tissues.
Used techniques: Polymer preparation, soft lithography, HPLC, GPC, FT-IR, rheometry, DMA, DSC.
Contract details: Fixed-term contract, prot. n. 37 (23/12/2009), from 04/01/2010 to 03/06/2010.
Project details: "Advanced Cardiovascular Therapies (ACTIVE)", P.O.R. F.E.S.R. 2007/2013.
Referent: Prof. Paolo Giusti.

10/2006-11/2006 **Research scholar**, *University of Pisa, Dept. of Chemical Engineering, Industrial Chemistry and Materials Science.*
Development of polymeric systems for technological applications.
Used techniques: Polymer membrane preparation, HPLC, GPC.
Contract details: Fixed-term contract, prot. n. n.a. (12/10/2006), from 12/10/2006 to 04/11/2006.
Referent: Prof. Paolo Giusti.

Fellowships

02/2019-Nowaday **Affiliate researcher**, *Istituto Italiano di Tecnologia, Center for Micro Bio-Robotics @SSSA.*
Synthesis of functional monomers to obtain mechanochromic materials.
Used techniques: Organic synthesis, FTIR-ATR, UV-Vis, NMR, HPLC.
Contract details: Prot. IIT n. 1441/19 (15/02/2019), from 08/02/2019 to 03/05/2019, renewed on 10/06/2019.
Referent: Prof. Barbara Mazzolai.

09/2017-11/2017 **Guest Scholarship**, *IMT School for Advanced Studies Lucca.*
Chemicophysical simulation of degradation phenomena in polymers.
Used techniques: FEM analysis, reaction-diffusion model, MATLAB.
Contract details: Prot. IMT n. 06235.VII.16 (01/12/2017), from 01/12/2017 to 28/02/2018.
Referent: Prof. Angelo Bifone, Prof. Barbara Mazzolai.

09/2017-11/2017 **Affiliate researcher**, *Istituto Italiano di Tecnologia, Center for Micro Bio-Robotics @SSSA.*
Development and characterization of molecularly imprinted degradable nanoparticles for the smart and enhanced Blood-Brain Barrier crossing.
Used techniques: ROP, chemical coupling, NMR, HPLC, GPC, FTIR-ATR, UV-Vis, fluorimetry, DSC, SEM, DLS, contact angle.
Contract details: Prot. IIT n. 25773/17 (30/08/2017), from 11/09/2017 to 30/11/2017.
Referent: Prof. Angelo Bifone, Prof. Barbara Mazzolai.

05/2016-09/2016 **Affiliate researcher**, *Istituto Italiano di Tecnologia, Center for Micro Bio-Robotics @SSSA.*
Preparation and characterization of flexible semi-organic capacitors, triggered by UV light and/or temperature, as components for Radio-Frequency IDentification devices (RFID).
Used techniques: Organic synthesis, radical polymerization, NMR, HPLC, GPC, FTIR-ATR, UV-Vis, DSC, SEM, electrical characterization.
Contract details: Prot. IIT n. 15310/16 (17/05/2016), from 17/05/2016 to 30/09/2016.
Referent: Dr. Virgilio Mattoli, Prof. Barbara Mazzolai.

Education

2007 – 2009 **PhD in Chemical and Materials Engineering**, *School of Doctorate "Leonardo da Vinci"*, University of Pisa.
Research topic: Experimental and computational study of new biomaterials for advanced cardiovascular applications (Link: http://etd.adm.unipi.it/theses/available/etd-03302010-143224/), diploma n. 251900 (06/07/2010).
Date: May 17, 2010; *Tutor*: Prof. P. Giusti.

2007 **Qualifying examination for Industrial Engineer profession**, University of Pisa.

2004 – 2006 **Master Degree in Chemical Engineering**, *Specialization in materials*, University of Pisa.
Final thesis: Computational and experimental study of implantable drug-eluting devices (Link: http://etd.adm.unipi.it/theses/available/etd-09192006-174410/), diploma n. 209291 (04/12/2006).
Date: Oct 11, 2006; *Tutors*: Prof. P. Giusti, Prof. G. Ciardelli, Ing. D. Silvestri; *Marks*: 110/110.

2001 – 2004 **Bachelor Degree in Chemical Engineering**, *Specialization in materials*, University of Pisa.
Final thesis: Study of polymeric systems used to obtain coatings for endovascular drug-eluting devices, diploma n. 147848 (27/07/2004).
Date: Jul 14, 2004; *Tutors*: Prof. G. Ciardelli, Dr. N. Barbani, Ing. D. Silvestri.

Participation to advanced schools

- Advanced scientific writing course, New York English Academy, Lucca, Jan-Mar 2017.
- Multiscale Simulations of Soft Matter with Hands-On Tutorials on ESPResSo++ and VOTCA, Centre Européen de Calcul Atomique et Moléculaire CECAM, Oct 10-14, 2016.

Collaborations in funded projects

- *Progettazione intelligente di vernici innovative funzionalizzate* (PROPAINT), in collaboration with Cromology Italia S.p.A., POR Regione Toscana FSE 2014/2020 (PI: Prof. M. Paggi).
- *Multi-field and multi-scale Computational Approach to design and durability of PhotoVoltaic Modules* (CA2PVM), ERC-2012-StG (PI: Prof. M. Paggi).
- *Taglio in testa poliammide semilavorata*, industrial project funded by GEFE Polymers S.r.l., 2016.
- *Nicchie staminali bioartificiali per l'ingegneria del tessuto cardiaco*, PRIN 2008 (PI: Prof. S. Mantero).
- *Advanced Cardiovascular Therapies* (ACTIVE), P.O.R. F.E.S.R. 2007/2013 (PI: Sorin Biomedica Cardio S.r.l.).
- *Development of numerical models for the evaluation of mechanical stresses in stenting procedure*, CASPUR Standard HPC Grant 2009 (PI: Dr. C. Cristallini).

Scientific production

Orcid ID: 0000-0002-5860-3141
ResearcherID: K-9439-2013
Scopus Author ID: 23995257200

See *Appendix A – Scientific production* for the full publication list and details on the Applicant's role.

Honors and Recognitions

- Invited talk: *Gagliardi M*, Paggi M, at the SOPHIA PV Module Reliability Workshop, **2019**.
- Associate Editor for American Journal of Engineering and Applied Sciences, from **2018**.
- Selected publication for special issue: Borri C, *Gagliardi M*, Paggi M. *Sol Energ Mat Sol Cells*, **2018**.
- Selected pitch: Gagliardi M, Paggi M, at the R2B Toscana Technologica Workshop, **2017**.
- Selected publication for special issue: Cristallini C, *Gagliardi M*, Barbani N, *et al. J Mater Sci Mat Med*, **2012**.
- Invited talk: Cristallini C, *Gagliardi M*, at the 2th Workshop Alfatest Reologia e Nanoformulazioni, **2011**.
- Interview: *Gagliardi M.* Tunable copolymers for drug-eluting stents. *Therap Deliv*, **2010**.

- Scholarship, funded by the University of Pisa, for the PhD programme, **2007/2009**.

Reviewer activity

Biomacromolecules; Solar Energy; Journal of Microencapsulation; Colloids and Surfaces A; Scientific Reports; Applied Surface Science; Current Pharmaceutical Design; Polymer Bulletin; ACS Applied Materials & Interfaces; Soft Matter; Journal of Materials Chemistry B; Chemical Engineering Science; European Polymer Journal; Materials Science and Engineering C; Journal of Biomedical Materials Research B; Drug Delivery; CardioVascular and Interventional Radiology; Colloids and Surfaces B: Biointerfaces; Nanotechnology, Science and Applications; International Journal of Nanomedicine; Coatings; Nanomedicine; Therapeutic Delivery.

Teaching and tutoring experience

2010/11 **Assistant professor**, *University of Pisa*, course of *Chemistry and Applied Chemistry* (BD in Energetic Engineering, 6 CFUs out of 12), prot. n. 98/C (28/01/2011).

2009/10 **Assistant professor**, *University of Pisa*, course of *Chemistry and Applied Chemistry* (BD in Energetic Engineering, 6 CFUs out of 12), prot. n. 4544/D7 (26/11/2009).

2007 – 2010 **Teaching assistant**, *University of Pisa*, for the following courses: *Bionanotechnologies* (MD in Biomedical Engineering); *Biostructures* (MD in Biomedical Engineering); *Medical devices* (MD in Biomedical Engineering); *Biomaterials* (BD in Chemical Engineering).

2007 – 2011 **Supervision of students and collaborators**, *University of Pisa*.
16 Bachelor Degree students, 5 Master Degree students, 3 post-graduate fellows.
See *Appendix B – Tutoring and supervision* for the full list of supervised students and fellows.

Other assignments

2016 – 2018 **PhD Admission Committee member**, *IMT School for Advanced Studies Lucca*.

2008 – 2011 **Degree Committee member**, *University of Pisa*, for BD and MD in Chemical Engineering and Biomedical Engineering.

2009 **Best oral presentation Committee member**, *Società Italiana Biomateriali*, at the SIB Conference 2009.

2008 **Organization Committee member**, *Società Italiana Biomateriali*, SIB Conference 2008.

Other qualifications

2006 **Full European Computer Driving License (ECDL)**, AICA, Cert. n. IT1069860 (02/11/2006).

2006 **English (B2 level), French (B1) and Spanish (B1)**, CLI, University of Pisa, Cert. n. 1154, 1155 and 1156 (27/07/2006).

Pisa, July 23, 2019

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Appendix A – Scientific production

Granted patents

1. *Gagliardi M*, Bifone A, Bertero A. Copolymer and nanoparticles obtained therefrom for drug delivery. Fondazione Istituto Italiano di Tecnologia (PCT/IB2014/061791, EP 3004202 A1, US 20160082109 A1).

2. Cristallini C, Giachino C, Barbani N, Cibrario Rocchietti F, *Gagliardi M*, Pagliaro P. A polymeric scaffold for cardiac regeneration and protection from reperfusion injury. Università degli studi di Torino e Università di Pisa (PCT/IB2014/058025, EP 2943230 A1).

Research papers

1. *Gagliardi M*, Paggi M. Multiphysics analysis of backsheet blistering in photovoltaic modules. *Sol Ener*, **2019**, 183: 512–520, doi: 10.1016/j.solener.2019.03.050 (IF: 4.374).
   Role of the applicant: Development and implementation of theoretical models, manuscript preparation.

2. *Gagliardi M.* Adhesion properties of poly(methylmethacrylate-*co*-*n*-butylmethacrylate) copolymers in stent coatings. *J Appl Polym Sci*, **2019**, 136(30): 47814, doi: 10.1002/app.47814 (IF: 1.901).

3. *Gagliardi M.* Mathematical modeling and experimental study of water diffusion and swelling in polymer films. *Macromol Theor Symul*, **2019**, 28(3): 1800063, doi: 10.1002/mats.201800063 (IF: 1.646).

4. *Gagliardi M*, Bifone A. Ring-opening copolymerization thermodynamics and kinetics of γ-valerolactone/ϵ-caprolactone. *PLoS ONE*, **2018**, 13(6): e0199231, doi: 10.1371/journal.pone.0199231 (IF: 2.766).
   Role of the applicant: Setup and execution of experiments, data analysis, manuscript preparation.

5. Borri C, *Gagliardi M*, Paggi M. Fatigue crack growth in Silicon solar cells and hysteretic behaviour of busbars. *Sol Energ Mat Sol Cells*, **2018**, 181: 21–29, doi: 10.1016/j.solmat.2018.02.016 (IF: 5.018).
   Role of the applicant: Electroluminescence tests, data elaboration, isolated areas and mechanical behavior modeling.

6. *Gagliardi M*, Paggi M. Long-term EVA degradation simulation: climatic zones comparison and possible revision of accelerated tests. *Sol Ener*, **2018**, 159: 882–897, doi: 10.1016/j.solener.2017.10.081 (IF: 4.374).
   Role of the applicant: Development of the theoretical model and implementation, manuscript preparation.

7. *Gagliardi M*, Pignatelli F, Mattoli V. Time- and solvent- dependent self-assembly of photochromic crystallites. *J Phys Chem C*, **2017**, 121: 24245–24251, doi: 10.1021/acs.jpcc.7b06388 (IF: 4.484).
   Role of the applicant: Synthesis and characterization of the photochromic molecule, manuscript preparation.

8. *Gagliardi M*, Lenarda P, Paggi M. A reaction-diffusion formulation to simulate EVA polymer degradation in environmental and accelerated ageing conditions. *Sol Energ Mat Sol Cells*, **2017**, 164: 93–106, doi: 10.1016/j.solmat.2017.-02.014 (IF: 5.018).
   Role of the applicant: Development of the theoretical model, manuscript preparation.

9. *Gagliardi M*, Bertero A, Bifone A. Molecularly imprinted biodegradable nanoparticles. *Sci Rep*, **2017**, 7: 40046, doi: 10.1038/srep40046 (IF: 4.122).
   Role of the applicant: Synthesis of macromers and nanoparticles, chemical, morphological and functional analysis, characterization of recognition properties and degradation, manuscript preparation.

10. Cristallini C, Cibrario Rocchietti E, *Gagliardi M*, Mortati L, Saviozzi S, Bellotti E, Turinetto V, Sassi MP, Barbani N, Giachino C. Micro- and macrostructured PLGA/gelatin scaffolds promote early cardiogenic commitment of human mesenchymal stem cells *in vitro*. *Stem Cells Int*, **2016**, 2016, Article ID 7176154, doi: 10.1155/2016/7176154 (IF: 3.989).
    Role of the applicant: Formulation of bioartificial blends, production of microstructured scaffolds through soft lithography, mechanical characterization in dry and wet conditions, analysis of the degradation behavior.

11. *Gagliardi M*, Bertero A, Bardi G, Bifone A. A poly(ether-ester) copolymer for the preparation of nanocarriers with improved degradation and drug delivery kinetics. *Mater Sci Eng C*, **2016**, 59: 488–499, doi: 10.1016/j.msec.2015.10.054 (IF: 5.080).

Role of the applicant: Synthesis, functionalization and characterization of materials and nanoparticles, manuscript preparation.

12. *Gagliardi M.* Experimental and computational study of mechanical and transport properties of a polymer coating for drug-eluting stents. *Therap Deliv*, **2015**, 6(11): 1255–1268, doi: 10.4155/tde.15.74.

13. *Gagliardi M*, Di Michele F, Mazzolai B, Bifone A. Chemical synthesis of a biodegradable PEGylated copolymer from ϵ-caprolactone and γ-valerolactone: evaluation of reaction and functional properties. *J Polym Res*, **2015**, 22(2): 16–27, doi: 10.1007/s10965-015-0661-2 (IF: 1.434).
Role of the applicant: Setup and preparation of copolymers, chemical, thermal and degradation characterization, manuscript preparation.

14. *Gagliardi M.* Polymeric PEGylated nanoparticles as drug carriers: how preparation and loading procedures influence functional properties. *J Appl Polym Sci*, **2015**, 132(3): 41310, doi: 10.1002/app.41310 (IF: 1.901).

15. *Gagliardi M.* On the effect of macromolecular composition and drug loading on thermal and tensile mechanical properties of methyl methacrylate and butyl methacrylate copolymers. *Polym Bull*, **2014**, 71(3): 533–544, doi: 10.1007/s00289-013-1075-0 (IF: 1.589).

16. Cristallini C, Cibrario Rocchietti E, Accomasso L, Folino A, Gallina C, Muratori L, Pagliaro P, Rastaldo R, Raimondo S, Saviozzi S, Sprio AE, *Gagliardi M*, Barbani N, Giachino C. The effect of bioartificial constructs that mimic myocardial structure and biomechanical properties on stem cell commitment towards cardiac lineage. *Biomaterials*, **2014**, 35(1): 92–104, doi: 10.1016/j.biomaterials.2013.09.058 (IF: 8.806).
Role of the applicant: Preparation of bioartificial blends and microstructured scaffolds, mechanical characterization to evaluate the viscoelastic behavior of the materials at different temperatures, and the mechanical anisotropy of the structure, analysis of the degradation behavior.

17. Bertero A, Boni A, Gemmi M, *Gagliardi M*, Bifone A, Bardi G. Surface functionalization regulates PAMAM dendrimer toxicity on Blood Brain Barrier cells and the modulation of key inflammatory receptors on microglia. *Nanotoxicology*, **2014**, 8(2): 158–168, doi: 10.3109/17435390.2013.765054 (IF: 5.811).
Role of the applicant: FTIR and Photon Correlation Spectroscopy characterizations.

18. *Gagliardi M. In vitro* haematic proteins adsorption and cytocompatibility study on acrylic copolymer to realise coatings for drug-eluting stents. *Mater Sci Eng C*, **2012**, 32(8): 2445–2451, doi: 10.1016/j.msec.2012.07.020 (IF: 5.080).

19. Cristallini C, *Gagliardi M*, Barbani N, Giannessi D, Guerra GD. Novel biodegradable, biomimetic and functionalised polymer scaffolds to prevent expansion of post-infarct left ventricular remodelling. *J Mater Sci Mater Med*, **2012**, 23(1): 205–216, doi: 10.1007/s10856-011-4506-1 (IF: 2.448).
Role of the applicant: Synthesis of copolymers and molecularly imprinted nanoparticles, mechanical characterization, degradation characterizations, nanoparticle characterization.

20. *Gagliardi M.* Computational models for the *in silico* analysis of drug delivery from drug-eluting stents. *Therap Deliv*, **2011**, 2(1): 1–3, doi: 10.1115/1.4028135.

21. Guerra GD, Cristallini C, Barbani N, *Gagliardi M.* Bioresorbable microspheres as devices for the controlled release of paclitaxel. *Int J Biol Biomed Eng*, **2011**, 3(5): 121–128, ISSN: 1998-4510.
Role of the applicant: Drug delivery tests and mathematical modeling.

22. Silvestri D, Barbani N, Guerra GD, *Gagliardi M*, Cristallini C. Biodegradable bioartificial materials made by chitosan and poly(vinyl alcohol). Part III: Materials toughened by means of a dehydrothermal treatment. *BME*, **2010**, 22(6): 509–517, doi: 10.4015/S1016237210002250 (IF: 0.233).
Role of the applicant: Mechanical, surface wettability, weight loss characterizations.

23. *Gagliardi M*, Silvestri D, Cristallini C. Macromolecular composition and drug-loading effect on the delivery of paclitaxel and folic acid from acrylic matrices. *Drug Deliv*, **2010**, 17(6): 452–465, doi: 10.3109/10717544.2010.483253 (IF: 3.095).
Role of the applicant: Setup of the system, synthesis of copolymers, drug delivery tests, manuscript preparation.

24. Silvestri D, Cristallini C, Domenichini M, *Gagliardi M*, Giusti P. Non conventional surface functionalization of porous poly-ϵ-caprolactone scaffolds using bioactive molecularly imprinted nanospheres. *BME*, **2010**, 22(5): 1–13,

doi: 10.4015/S1016237210002109 (IF: 0.233).
Role of the applicant: Synthesis of molecularly imprinted nanospheres, manuscript preparation.

25. *Gagliardi M*, Silvestri D, Cristallini C, Guadagni M, Crifaci G, Giusti P. Combined drug release from biodegradable bilayer coating for endovascular stents. *J Biomed Mater Res B Appl Biomater*, **2010**, 93(2): 375–385, doi: 10.1002/jbm.b.31592 (IF: 3.373).
Role of the applicant: Preparation of multi-layer samples, drug delivery and degradation tests, manuscript preparation.

26. Silvestri D, *Gagliardi M*, Cristallini C, Barbani N, Giusti P. Different composition poly(methyl methacrylate-*co*-butyl methacrylate) copolymers through seeded semi-batch emulsion polymerization. *Polym Bull*, **2009**, 63(3): 423–439, doi: 10.1007/s00289-009-0095-2 (IF: 1.589).
Role of the applicant: Synthesis of copolymers, analysis of reaction kinetics, manuscript preparation.

27. Silvestri D, *Gagliardi M*, Barbani N, Cristallini C, Giusti P. Synthesis and characterization of copolymers of methylmethacrylate and 2-hydroxyethyl methacrylate for the aqueous solubilisation of Paclitaxel. *Drug Deliv*, **2009**, 16(2): 116–124, doi: 10.1080/10717540802666980 (IF: 3.095).
Role of the applicant: Synthesis of copolymers, analysis of reaction kinetics, drug delivery and swelling kinetics analysis, manuscript preparation.

28. Silvestri D, Cristallini C, *Gagliardi M*, D'Acunto M, Barbani N, Ciardelli G, Giusti P. Acrylic copolymers as candidates for drug eluting coating of vascular stents. *J Biomater Appl*, **2009**, 24(4): 353–383, doi: 10.1177/0885328208095198 (IF: 2.082).
Role of the applicant: Synthesis of copolymers, surface wettability characterization, characterization of adhesion through peeling tests, AFM force-distance curves data analysis, drug delivery tests, manuscript preparation.

Invited reviews

1. *Gagliardi M.* Recent advances in preclinical studies and potential applications of dendrimers as drug carriers in the Central Nervous System. *Curr Pharm Des*, **2017**, 23(21): 3105-3119 (IF: 2.757).

2. *Gagliardi M.* Biomimetic and bioinspired nanoparticles for targeted drug delivery. *Ther Deliv*, **2017**, 8(5): 289-299.

3. *Gagliardi M*, Borri C. Polymer Nanoparticles as Smart Carriers for the Enhanced Release of Therapeutic Agents to the CNS. *Curr Pharm Des*, **2017**, 23(3): 393-410 (IF: 2.757).

4. *Gagliardi M.* Novel biodegradable nanocarriers for enhanced drug delivery. *Ther Deliv*, **2016**, 7(12): 809-826.

5. *Gagliardi M*, Mazzolai B. Molecularly imprinted polymeric micro-and nano-particles for the targeted delivery of active molecules. *Future Med Chem*, **2015**, 7(2): 123-138 (IF: 3.969).

6. Gamucci O, Bertero A, *Gagliardi M*, Bardi G. Biomedical nanoparticles: overview of their surface immune-compatibility. *Coatings*, **2014**, 4(1):139-159 (IF: 2.350).

7. *Gagliardi M*, Bardi G, Bifone A. Polymeric nanocarriers for controlled and enhanced delivery of therapeutic agents to the CNS. *Therap Deliv*, **2012**, 3(7): 875-887.

8. Guerra GD, Barbani N, *Gagliardi M*, Rosellini E, Cristallini C. Chitosan-based macromolecular biomaterials for the regeneration of chondroskeletal and nerve tissue. *Int J Carbohydr Chem*, **2011**, ID 303708.

Book chapters

1. *Gagliardi M*, Bardi G, Gamucci O, Mazzolai B. Targeted drug delivery across biological barriers using polymer nanoparticles. In: Therapeutic Delivery Methods: A concise overview of emerging areas. Beom-Jin Lee (Ed.), Future Science Ltd, **2013**, pp 96–109, eISBN: 978-1-909453-49-4.

2. *Gagliardi M.* Relevance of mesh dimension optimization, geometry simplification and discretization accuracy in the study of mechanical behaviour of bare metal stents. In: Methods, Models, and Computation for Medical Informatics. Gangopadhyay A (Ed.), IGI Global, **2013**, pp. 1–15, eISBN13: 9781466602830.

3. Guerra GD, *Gagliardi M*, Barbani N, Cristallini C. Controlled release of the anti-cancer drug Paclitaxel from bioresorbable poly(ester-ether-ester) microspheres. In: Recent Researches in Modern Medicine. Braissant O, Wakamatsu H, Kuo-Kang Allegaert K, Yonwimon L, Wachholtz A. (Eds.) **2011**, 210–217, ISBN: 9789604742783.

Proceedings (peer-reviewed)

1. *Gagliardi M*, Berardone I, Paggi M. Experimental characterization and numerical simulation of humidity-induced damage in PV cells. In: Online Conference Proceedings of 33rd European Photovoltaic Solar Energy Conference and Exhibition, **2017**, pp. 1716-1719, ISBN: 3-936338-47-7.

2. *Gagliardi M*, Lenarda P, Paggi M. Simulation of reaction-diffusion systems to assess EVA degradation in accelerated and environmental ageing conditions: a tool to design novel accelerated climate tests. In: Online Conference Proceedings of 32nd Symposium Photovoltaic Solar Energy, **2017**.

3. *Gagliardi M*, Lenarda P, Paggi M. A computational method to simulate thermo-oxidative degradation phenomena of poly(ethylene-*co*-vinyl acetate) used in photovoltaics. In: GIMC-GMA 2016, Atti del Convegno, Paggi M, Bacigalupo A, Bennati S, Borri C, Corrado M, Gizzi A, Valvo PS. (Eds.), Sesto Fiorentino, Firenze, Tipografia Contini, **2016**, pp. 38-39, ISBN: 9791220013338.

4. *Gagliardi M*, Silvestri D, Cristallini C, Giusti P. Single and simultaneous release of drugs with different hydrophilicity from acrylic matrices. *J Appl Biomater Funct Mater*, **2010**, 8(2):113 (IF: 1.067).

5. Guerra GD, Barbani N, Cristallini C, *Gagliardi M*, Rosellini E, Silvestri D. Poly(vinyl alcohol)-chitosan blends modified by means of a dehydrothermal treatment, *J Appl Biomater Funct Mater*, **2010**, 8(2):118 (IF: 1.067).

6. *Gagliardi M*, Silvestri D, Cristallini C, Guadagni M, Crifaci G, Giusti P. Study of drug release mechanisms from PLGA/PHBHV bi-layered biodegradable polymeric matrices. *J Appl Biomater Biomech*, **2009**, 7:64 (IF: 1.160).

7. *Gagliardi M*, Silvestri D, Barbani N, Cristallini C, Bellotti E, Parrini S, Giusti P. Poly(methylmethacrylate-*co*-butylmethacrylate) copolymer from monomer-starved seeded semi-batch reaction for biomedical use. *J Appl Biomater Biomech*, **2009**, 7:63 (IF: 1.160).

8. Silvestri D, *Gagliardi M*, Cristallini C, Baldoli I, Zecca M, Giusti P. Drug elution of hydrophilic and hydrophobic drugs from biostable acrylic matrices. *J Appl Biomater Biomech*, **2009**, 7:62 (IF: 1.160).

9. Cristallini C, Ruffini A, Ranzani T, Barbani N, Rosellini E, Silvestri D, *Gagliardi M*, Guerra GD, Giusti P. Smart polymer nanocomplexes obtained by template polymerisation for drug targeting. *J Appl Biomater Biomech*, **2009**, 7:60 (IF: 1.160).

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11. Barbani N, Cristallini C, *Gagliardi M*, Guerra GD, Silvestri D. Bioartificial chitosan-poly(vinyl alcohol) blends as biomaterials. *Biomed Pharmacother*, **2008**, 62(8):487 (IF: 2.759).

12. *Gagliardi M*, Silvestri D, Cristallini C, Giusti P. Experimental characterization and computational modelling of polymeric materials used as stents coatings. In: Congresso Nazionale di Bioingegneria 2008, Atti, pagg. 349-350, R. Burattini, R. Contro, P. Dario, L. Landini, Pàtron Editore, **2008**, ISBN: 978-88-555-2983-9.

13. *Gagliardi M*, Barbani N, Cristallini C, Guerra GD, Krajewski A, Mazzocchi M. Composites between collagen and hydroxyapatite, a preliminary physicochemical and biological investigation on interactions between collagen and hydroxyapatite. In: 11th Meeting and Seminar on: Ceramics Cells and Tissues, Annual Conference, Faenza, October 2-5, **2007**, pp. 182-191, A. Ravaglioli, A. Krajewski (Eds.), ISBN: 88-8080-085-X.

14. Silvestri D, Cristallini C, *Gagliardi M*, Guadagni M, Barbani N, Giusti P. Combined drug release from biodegradable bi-layer coating for endovascular stents. *J Appl Biomater Biomech*, **2007**, 5:209 (IF: 1.160).

Contributions in conferences

Talks

1. *Gagliardi M*, Paggi M. Modelling and simulation of EVA degradation: accelerated aging tests *vs.* long-term outdoor exposure. SOPHIA PV Module Reliability Workshop, 2019, Graz, May 28-29 (invited speaker).

2. Borri C, *Gagliardi M*, Paggi M. Evolution of fatigue damage in flexible photovoltaic modules. Photovoltaic Technical Conference, 2017, Marseille, Apr 26-28 (co-author).

3. Berardone I, *Gagliardi M*, Lenarda P, Paggi M. Computational and experimental characterization of thermo-oxidative degradation and corrosion phenomena on photovoltaic modules. Photovoltaic Technical Conference, 2017, Marseille, Apr 26-28 (co-author).

4. *Gagliardi M*, Lenarda P, Paggi M. Simulation of reaction-diffusion systems to assess EVA degradation in accelerated and environmental ageing conditions: a tool to design novel accelerated climate tests. 32nd Symposium Photovoltaic Solar Energy, 2017, Bad Staffelstein, Mar 8-10 (speaker).

5. *Gagliardi M*, Lenarda P, Paggi M. A computational method to simulate thermo-oxidative degradation phenomena of poly(ethylene-*co*-vinyl acetate) used in photovoltaics. XXI Convegno Italiano di Meccanica Computazionale, 2016, Lucca, Jun 27-29 (speaker).

6. Cristallini C, Barbani N, Bellotti E, Manetti F, Rosellini E, *Gagliardi M*, Del Gaudio E, Tricoli F, Mantero S. Modulation of MMP-9/TIMP activity in preventing cardiac disfunction through a combination of molecularly imprinting technology and biodegradable microfabricated systems. Congresso Nazionale Biomateriali, 2012, Lecce, Jun 18-20 (co-author).

7. *Gagliardi M*, Schiavello L, Cristallini C. Experimental and computational study of the dual drug release from polymeric stent coatings. 24rd European Conference on Biomaterials, 2011, Dublin, Sep 4-8 (speaker).

8. Cristallini C, *Gagliardi M*, Barbani N, Russo Fiorillo S, Bonaretti A. Novel biodegradable, biomimetic and functionalised polymer scaffolds to prevent expansion of post-infart left ventricular remodelling. 24rd European Conference on Biomaterials, 2011, Dublin, Sep 4-8 (co-author).

9. Cristallini C, *Gagliardi M*, Guerra GD, Russo Fiorillo S, Barbani N. New bioartificial microstructures in combination with molecularly imprinted nanoparticles for the treatment of myocardial infarction. Congresso Nazionale Biomateriali, 2011, Bari, May 23-25 (co-author).

10. Guerra GD, Cristallini C, Barbani N, *Gagliardi M*. Release of anti-restenotic drugs from macromolecular materials useful for covering vascular stents. Congresso Nazionale Biomateriali, 2011, Bari, May 23-25 (co-author).

11. Cristallini C, *Gagliardi M*. Applicazione dell'analisi reologica allo sviluppo di nuovi sistemi polimerici iniettabili e termoreversibili per l'ingegnerizzazione del tessuto cardiaco. 2th Workshop Alfatest Reologia e Nanoformulazioni, 2011, Milano, Feb 2 (invited speaker).

12. *Gagliardi M*, Barbani N, Cristallini C. Design, fabrication and preliminary characterization of a bioartificial scaffold for tissue engineering. Congresso Nazionale Biomateriali, 2010, Camogli, May 24-26 (speaker).

13. Guerra GD, Barbani N, Cristallini C, *Gagliardi M*, Rosellini E, Silvestri D. Poly(vinil alcohol)-chitosan blends modified by means of a dehydrothermal treatment. Congresso Nazionale Biomateriali, 2009, Salice Terme, Jun 15-17 (co-author).

14. *Gagliardi M*, Silvestri D, Cristallini C, Giusti P. Studio dei meccanismi di rilascio di farmaco da matrici polimeriche biodegradabili. Congresso Nazionale Biomateriali, 2008, Follonica, Sep 17-19 (speaker).

15. Silvestri D, *Gagliardi M*, Barbani N, Baldoli I, Giusti P, Cristallini C. Materiali copolimerici a base acrilica per il rilascio di farmaci idrofilici e idrofobici. Congresso Nazionale Biomateriali, 2008, Follonica, Sep 17-19 (co-author).

16. *Gagliardi M*, Barbani N, Cristallini C, Guerra GD, Krajewski A, Mazzocchi M. Composites between collagen and hydroxyapatite. Ceramics, Cells and Tissues, 11th Annual Seminar & Meeting, 2007, Faenza, Oct 2-5 (speaker).

17. Silvestri D, Cristallini C, *Gagliardi M*, Barbani N, Giusti P. Studio di materiali biodegradabili per il rilascio combinato di farmaci da stent vascolari. Congresso Nazionale Biomateriali, 2007, Bologna, May 28-29 (co-author).

Posters

1. *Gagliardi M*, Berardone I, Paggi M. Experimental characterization and numerical simulation of PV cells humidity-induced corrosion. 33rd European Photovoltaic Solar Energy Conference and Exhibition, 2017, Amsterdam, Sep 25-29.

2. Cristallini C, *Gagliardi M*, Bellotti E, Manetti F, Rosellini E, Barbani N. Development of new stimuli-responsive polymeric nanoparticles for drug targeting. European Polymer Conference, 2013, Pisa, Jun 16-21.

3. *Gagliardi M*, Silvestri D, Cristallini C. Modelling drug delivery from stents through a finite element analysis. 23rd European Conference on Biomaterials, 2010, Tampere, Sep 11-15.

4. *Gagliardi M*, Silvestri D, Cristallini C, Barbani N. Synthesis and characterization of a novel pH-sensitive nanocarrier for targeted drug delivery. 23rd European Conference on Biomaterials, 2010, Tampere, Sep 11-15.

5. Barbani N, Rosellini E, Cristallini C, Ciardelli G, *Gagliardi M*, Giusti P. Molecularly imprinted scaffolds for tissue growth technology. 23rd European Conference on Biomaterials, 2010, Tampere, Sep 11-15.

6. Barbani N, Cristallini C, Rosellini E, Guerra GD, *Gagliardi M*, Giusti P. Polymeric supports in polysulfone functionalized by Molecular Imprinting Technology for protein recognition. Congresso Nazionale Biomateriali, 2010, Camogli, May 24-26.

7. Silvestri D, *Gagliardi M*, Cristallini C, Giusti P. Single and combined drug elution of hydrophilic and hydrophobic drugs from acrylic matrices obtained by monomer-starved seeded semi-batch emulsion polymerization. 22nd European Conference on Biomaterials, 2009, Lausanne, Sep 7-11.

8. *Gagliardi M*, Silvestri D, Cristallini C, Barbani N, Giusti P. Computational evaluation of the mechanical behaviour of drug-loaded coatings for endovascular stents. 22nd European Conference on Biomaterials, 2009, Lausanne, Sep 7-11.

9. *Gagliardi M*, Silvestri D, Cristallini C, Giusti P. Single and simultaneous release of drugs with different hydrophilicity from acrylic matrices. Congresso Nazionale Biomateriali, 2009, Salice Terme, Jun 15-17.

10. *Gagliardi M*, Baldoli I, Silvestri D, Parrini S, Barbani N, Giusti P. Copolimero poli(metilmetacrilato-*co*-butilmetacrilato) per uso biomedico mediante reazione "monomer-starved seeded semi-batch". Congresso Nazionale Biomateriali, 2008, Follonica, Sep 17-19.

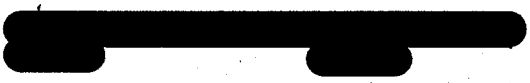
11. Barbani N, Cristallini C, Pulizzi R, *Gagliardi M*, Rechichi A, Guerra GD, Giusti P. Preparazione e caratterizzazione funzionale di matrici polisaccaridiche in forma di microsfere per il rilascio controllato di farmaci. Congresso Nazionale Biomateriali, 2008, Follonica, Sep 17-19.

12. Cristallini C, Ruffini A, Ranzani T, Barbani N, Rosellini E, Silvestri D, *Gagliardi M*, Giusti P, Guerra GD. Nanocomplessi polimerici intelligenti ottenuti per polimerizzazione su matrice per il drug targeting. Congresso Nazionale Biomateriali, 2008, Follonica, Sep 17-19.

13. Silvestri D, *Gagliardi M*, Cristallini C, Barbani N, Giusti P. Synthesis of poly(methylmethacrylate-*co*-butylmethacrylate) copolymer and its characterization as drug-eluting material for cardiovascular applications. 8th World Biomaterials Congress, 2008, Amsterdam, May 28 - Jun 1.

14. Silvestri D, *Gagliardi M*, Cristallini C, Rosellini E, Giusti P. Study of polymer coatings for drug delivery through experimental characterization and computational modelling. 21st European Conference on Biomaterials, 2007, Brighton, Sep 9-13.

Pisa, July 23, 2019



Appendix B – Tutoring and supervision

Post-graduate Fellows

1. Dr. Luigi Schiavello (MD in Biomedical Engineering, 2010/11);
2. Dr. Agnese Sgorbini (MD in Biomedical Engineering, 2010/11);
3. Dr. Alessandro Sala (MD in Biomedical Engineering, 2010/11);

Master Degree Students

1. Applicazione delle nanotecnologie per il miglioramento delle terapie farmacologiche: realizzazione di nanocarrier multifunzionali per il drug targeting. Student: Elena Bellotti. Tutors: Cristallini C, *Gagliardi M.* MD in Biomedical Engineering, 2010/11.
2. Sviluppo di scaffold biodegradabili multifunzionali a base di copolimeri poli(estere-etere-estere) per la realizzazione di nicchie sintetiche per cellule staminali. Student: Sara Russo Fiorillo. Tutors: Cristallini C, *Gagliardi M.* MD in Biomedical Engineering, 2010/11.
3. Studio meccanico e rilascio di farmaco da Eluting Stents: simulazione numerica dell'espansione e del trasporto di massa nella parete vasale. Student: Luigi Schiavello. Tutors: Mauri R, *Gagliardi M.* MD in Biomedical Engineering, 2010/11.
4. Studio di fenomeni di trasporto di farmaco mediante analogia termica con uso degli elementi finiti. Student: Raffaele Maffei. Tutors: Giusti P, Silvestri D, *Gagliardi M.* MD in Chemical Engineering, 2009/10.
5. Studio modellistico di materiali polimerici utilizzati come rivestimenti per dispositivi endovascolari. Student: Federico Lensi. Tutors: Giusti P, *Gagliardi M*, Silvestri D. MD in Biomedical Engineering, 2007/08.

Bachelor Degree Students

1. Novel injectable polymeric scaffolds mimicking the extracellular matrix able to limit infarct progression and prevent left ventricular dysfunction after myocardial infarction. Student: Marco Guadagni. Tutors: Cristallini C, *Gagliardi M.* BD in Biomedical Engineering, 2010/11.
2. Application of nanotechnologies for the development of instructive and intelligent scaffolds for cardiac tissue engineering. Student: Bonini Federica. Tutors: Cristallini C, *Gagliardi M.* BD in Biomedical Engineering, 2010/11.
3. Combination of multiple factors at meso- micro- and nano-scale level into functional polymeric scaffolds to promote *in vitro* cardiac tissue regeneration. Student: Tommaso Borzone. Tutors: Cristallini C, *Gagliardi M.* BD in Biomedical Engineering, 2010/11.
4. Sviluppo di nuovi nanocarrier polimerici intelligenti pH- e temperatura-sensibili per il rilascio mirato di principi attivi. Student: Federica De Paola. Tutors: Cristallini C, *Gagliardi M.* BD in Biomedical Engineering, 2010/11.
5. Sintesi e caratterizzazione di un nuovo copolimero a due blocchi biodegradabile e termoreversibile per la realizzazione di scaffold iniettabili. Student: Viviana Aprile. Tutors: Cristallini C, *Gagliardi M.* BD in Biomedical Engineering, 2010/11.
6. Sviluppo di nuove nanoparticelle bioartificiali ottenute mediante polimerizzazione su matrice per applicazioni biomediche. Student: Nicola Punzi. Tutors: Cristallini C, *Gagliardi M.* BD in Biomedical Engineering, 2010/11.
7. Sintesi di biomateriali peghilati a base acrilica in forma micro-nanoparticellare. Student: Simony Paolicchi da Silva Pereira. Tutors: Polacco G, Silvestri D, Cristallini C, *Gagliardi M.* BD in Chemical Engineering, 2009/10.
8. Sviluppo di nuovi sistemi bioartificiali iniettabili e termoreversibili per la rigenerazione del tessuto cardiaco. Student: Marco Borghini. Tutors: Cristallini C, *Gagliardi M.* BD in Biomedical Engineering, 2009/10.
9. Preparazione ed analisi funzionale di matrici bioartificiali impiantabili per l'ingegnerizzazione del tessuto cardiaco. Student: Brigida Viggiano. Tutors: Cristallini C, *Gagliardi M.* BD in Biomedical Engineering, 2009/10.

10. Effetto del caricamento di farmaco sul comportamento meccanico di polimeri acrilici. Student: Nicoletta Fotino. Tutors: Giusti P, Silvestri D, *Gagliardi M.* BD in Biomedical Engineering, 2008/09.

11. Analisi del rilascio combinato di due principi attivi da matrici polimeriche a base acrilica. Student: Mariachiara Zecca. Tutors: Giusti P, Cristallini C, Silvestri D, *Gagliardi M.* BD in Biomedical Engineering, 2008/09.

12. Studio degli effetti della biodegradazione sul rilascio di farmaco da matrici polimeriche biodegradabili. Student: Giulia Crifaci. Tutors: Cristallini C, Silvestri D, *Gagliardi M.* BD in Biomedical Engineering, 2008/09.

13. Sintesi di copolimeri a base di acido acrilico per uso biomedico. Student: Giada Gerboni. Tutors: Giusti P, Barbani N, Silvestri D, *Gagliardi M.* BD in Biomedical Engineering, 2007/08.

14. Analisi del rilascio controllato di farmaco da matrici copolimeriche a base acrilica. Student: Ilaria Baldoli. Tutors: Giusti P, Cristallini C, *Gagliardi M*, Silvestri D. BD in Biomedical Engineering, 2007/08.

15. Sintesi e caratterizzazione di copolimeri acrilici per uso biomedico. Student: Simone Parrini. Tutors: Giusti P, Cristallini C, Silvestri D, *Gagliardi M.* BD in Biomedical Engineering, 2007/08.

16. Studio funzionale del copolimero poli(metilmetacrilato-*co*-butilmetacrilato) per uso vascolare. Student: Francesca Sau. Tutors: Giusti P, Cristallini C, *Gagliardi M*, Silvestri D. BD in Biomedical Engineering, 2007/08.

Lucca, July 23, 2019

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