CURRICULUM VITAE
Lina Altomare, PhD

PERSONAL DATA

First name/ Surname Lina Altomare
E mail: lina.altomare@polimi.it
Nationality: Italian

EDUCATION

5 April 2017	**National scientific qualification for Associate Professor position** in 09/D1 Sector (Materials Science and Technology). Abilitazione Scientifica Nazionale al ruolo di Professore Associato, settore concorsuale 09/D1.
20 May 2008	**PhD degree in Materials Engineering**, Politecnico di Milano, with thesis entitled "Surface modifications to regulate cell functions". Tutor Prof A. Cigada
2004	**Italian Professional Engineering Licensure** (Abilitazione alla professione di Ingegnere). 1st Session, Ordine degli Ingegneri di Milano c/o Politecnico di Milano, Milano (Italy)
20 April 2004	**'Laurea'**, equivalent to B.Sc. + M.Sc. degree, in Biomedical Engineering, Politecnico di Milano (Italy) mark 92/100, with dissertation entitled: 'Tribological characterization of Ni-free stainless steel for Artificial Joints' Tutor Prof. A. Cigada
1998	**Diploma di Maturità Scientifica** (equivalent to secondary school), from the Liceo Scientifico of Rogliano (CS) with full marks 60/60)

WORK EXPERIENCE

Oct 2015 – present	***Assistant Professor*** (Ricercatore t.d. l240/10) in Materials Science and Technology (09/D1), Politecnico di Milano, (Italy). Department of Chemistry, Materials and Chemical Engineering "G. Natta"
Feb. 2014 – sept 2015	***Researcher*** (Ricercatore Tirocinante t.d. SSD ING/IND 22), INSTM - Italian Interuniversity Consortium on Materials Science and Technology, Politecnico di Milano Local Unit
Feb. 2011 – Jan. 2014	***Research fellow*** *(co.co.pro.),* Politecnico di Milano on '*Surface-associated selective transfection'* FIRB project RBFR08XH0H
Oct. 2008 – Jan. 2011	***Research fellow*** *(assegno di ricerca),* Politecnico di Milano, on *'Design and validation of scaffolds for ligament regeneration'*
Apr. 2008 – Sept. 2008	***Research fellow*** *(assegno di ricerca),* Politecnico di Milano, on *'Design and fabrication of micro and nanostructured scaffolds for skeletal regenerative medicine'*

TEACHING ACTIVITY

LECTURER

From a.y. 17/18	**Politecnico di Milano. "Materiali per il Design degli Interni - Applicazioni dei Materiali nel Design"** CFU 3, Bachelor in Interior Design, I year
From a.y. 17/18	**Politecnico di Milano. "Laboratorio di sintesi finale-applicazioni dei materiali nel design"** CFU 2, Bachelor in Product Design, III year
a.y. 14/15 and 16/17	**Politecnico di Milano. "Process and Materials Innovation in Fashion Design"** CFU 3, Master in Design for the Fashion System - Design per il Sistema Moda, I year
From a.y. 09/10 to a.y.13/14	**Politecnico di Milano**. "**Laboratorio di Micro e Nano Strutture**" CFU 2.5 Master in Biomedical Engineering, II year
a.y. 13/14	**Politecnico di Milano. "Innovazione dei materiali e delle tecnologie"** CFU 3, Master in Design for the Fashion System - Design per il Sistema Moda, I year
a.y. 10/11	**Politecnico di Milano**. "**Laboratorio di Biocompatibilità e Colture Cellulari**" CFU 2.5 Master in Biomedical Engineering, II year

ASSISTANT LECTURER

From a.y. 06/07 to a.y.12/13	**Politecnico di Milano**. "**Materiali per il Design (c.i) - Scienza dei materiali"** Prof. A. Cigada, Bachelor in Industrial Design, I year
From a.y. 09/10 to a.y.12/13	**Politecnico di Milano**. "**Materiali per il Design (c.i) - Scienza dei materiali"** Prof. L. De Nardo, Bachelor in Design for the Fashion System, I year
a.y. 07/08 and 08/09	**Politecnico di Milano**. "**Strutture Bioartificiali e Biomimetiche**" Prof. M.C. Tanzi, Master in Biomedical Engineering, II year
From a.y. 06/07to a.y.09/10	**Politecnico di Milano**. **"Biomateriali"** Prof R. Chiesa, Master in Biomedical Engineering, I year
From a.y. 08/09 to a.y. 12/13	**Politecnico di Milano**. "**Materiali e Tecnologie (c.i.) – Materiali e tecnologie per la moda"** L. Draghi, Master in Design for the Fashion System, I year
From a.y. 06/07 to a.y. 08/09	**Politecnico di Milano**. "**Laboratorio di Micro e Nano Strutture**" Prof. S. Farè, Master in Biomedical Engineering, II year

SUPERVISOR OF PHD THESIS, MASTER THESIS AND BACHELOR PROJECT

2016-2018	Supervisor of a PhD thesis in Bioengineering 'Innovative strategies to control cell fate and gene delivery behaviour'. E. Giupponi
From 2010	Supervisor of 15 Master thesis in Biomedical Engineering, Politecnico di Milano
From 2010	Supervisor of 15 Bachelor Project in Biomedical Engineering, 5 Bachelor Projects in Product Design at Politecnico di Milano and two Bachelor project in Biotechnology (University of Insubria (VA))

RESEARCH ACTIVITY AT INTERNATIONAL INSTITUTES AND LABORATORIES

Oct. 2014 – Dec. 2014 and Feb 2015

ETH – Zurich, SWITZERLAND
Visiting researcher at Laboratories directed by Professor Chiara Daraio, Department of Mechanical and Process Engineering
- Start up of a new laboratory of cells culture (class II)
- Fabrication of microstructured microtubes for studying and modulating muscle cells behavior

May 2009

LAVAL UNIVERSITY – Québec, QC, CANADA
Visiting researcher at Laboratoire de Biomatériaux et de Bioingénierie, Directed by Prof. D. Mantovani
- Compliance assays on silk fibroin microtubes fabricated by electrospinning

Oct. 2007 – Dec. 2007

UNIVERSITY OF GLASGOW – Glasgow**,** UK
Visiting PhD student at the Centre for Cells Engineering (CCE) under the supervision of Prof. N. Gadegaard and Prof M. Rihele
- Fabrication of microstructured surfaces by microcontact printing
- Evaluation of cells behavior on micropatterned surfaces by immunofluorescence assays and microscopic analysis

Oct. 2006 – Dec. 2006

UNIVERSITY OF GLASGOW – Glasgow, UK
Visiting PhD student at the Centre for Cells Engineering (CCE) under the supervision of Prof. N. Gadegaard
- Work in a cleanroom to fabricate by photolithography and replica molding different microgrooved surfaces

Aug. 2004 – Oct. 2004

ÉCOLE POLYTECHNIQUE DE MONTRÉAL – Montréal, QC, CANADA
Internship at Laboratoire d'Innovation et d'Analyse de la Biopérformance (LIAB) under the supervision of Prof. L'H. Yahia
- Surface modifications on NiTi alloys by plasma process
- Surface characterization by contact angle, environmental scanning electron microscopy, XRD, XPS

Sep. 2002 – Jan. 2003

UNIVERSITÉ DE TECHNOLOGIE DE COMPIÈGNE – Compiègne, FRANCE
Erasmus Program.

LANGUAGE SKILLS

Italian — **Mother Tongue**

English — Understanding: i) Listening: independent user; ii) Reading: proficient user. Speaking: i) Spoken interaction: independent user; ii) Spoken production: independent user. Writing: independent user

French — Understanding: i) Listening: proficient user; ii) Reading: proficient user. Speaking: i) Spoken interaction: proficient user; ii) Spoken production: proficient user. Writing: independent user
DALF certification in 2004

PhD SCHOOL

9–13 Oct. 2007	**4th Marie Curie Cutting-Edge Conference** "Biocompatibility evaluation and biological behaviour of polymeric biomaterials". Alvor, Portugal
13–16 Jun. 2006	**VII P.G. Orsini School** "Caratterizzazione microstrutturale dei materiali per l'ingegneria", Trento, Italy
17–22 Oct. 2005	**XI National School** on Materials Science, Palazzone di Cortona, Cortona (AR), Italy
26–29 Sep. 2005	**XXIV Annual School** of the National Bioengineering Group (Gruppo Nazionale di Bioingegneria) "Biomateriali: dagli impianti protesici alla medicina rigenerativa", Bressanone (BZ), Italy
11–15 Jul. 2005	**12th CIRMIB school** 1st EXPERTISSUES "From Biomedical devices to molecular recognition and tissue engineered product", Ischia Porto (NA), Italy

MEMBERSHIP

2012-today	**Member of AIMAT** – Italian society for Materials Engineering (Associazione Italiana di Ingegneria dei Materiali)
2010-today	**Member of Interuniversity Consortium for Materials Science and Engineering** (Consorzio Interuniveristario Nazionale per la Scienza e la Tecnologia dei Materiali, INSTM)
2006-today	**Member of European Society of Biomaterials** (ESB)
2006-today	**Member of Italian Society for Biomaterials** (SIB)

INVITED LECTURES

Jul 18-22 2015	**20 AIMAT – SIB School Rivestimenti e trattamenti funzionali. '**Leghe metalliche Biodegradabili'
June 22 2015	**ART&NT Institute**, Milano 'Innovative technologies in textile'
Oct 1st 2015	**Nanoforum Milano '**Materiali Polimerici Naturali per la Realizzazione di Scaffold Microstrutturati mediante Deposizione Elettrochimica'

EDITORIAL BOARD AND REVIEWER FOR INTERNATIONAL JOURNALS

Oct 2018 – today	**Associate Editor**. Journal of Applied Biomaterials and Functional Materials (JAB-FM)
From 2010	**Reviewer for the following international journals**: Acta Biomaterialia ISSN 1742-7061; IF: 5.684; Biomacromolecules ISSN 1525-7797; IF 5.788; Advanced Healthcare Materials ISSN 2192-2640; IF 4.88 Acta Biochimica et Biophysica Sinica ISSN: 1672-9145; IF 2.089 Journal of Non-Crystalline Solids ISSN 0022-3093; IF 1.716; Journal of Applied Biomaterials - Functional Materials FORMER Journal of Applied Biomaterials & Biomechanics ISSN 2280-8000, IF: 0.761

AWARDS

Best Oral presentation "Cross-linked chitosan patches for topical oral drug delivery", Congresso Nazionale Biomateriali SIB 2015 03-05/06/2015 Portonovo (AN)

"H.M. GOLDMAN PRIZE" 2013 of the Italian Society of Periodontology and Implantology for the work 'Multi-layered chitosan-based construct and periodontal regeneration: functional layers for multi-tissue interface'

"Student THERMEC Award" at the THERMEC 2011 International Conference on Processing & Manufacturing of Advanced Materials1st-5th August (Quebec City, Canada)

"Student travel award" at the 4th Marie Curie Cutting-Edge Conference "Biocompatibility evaluation and biological behavior of polymeric biomaterials", Alvor, Portugal 9–13 Oct. 2007

SCIENTIFIC COLLABORATION

Research activity in collaboration with National and International Universities and Research Centers

- Prof. C. Daraio, ETH Zurich (Switzerland) now at CalTech, Pasadena, CA, USA
- Prof. A.R. Boccaccini, University of Erlangen-Nuremberg, Germany
- Prof. F. Variola, University of Ottawa, Ottawa, ON, Canada
- Dr. L.P. Lefebvre, Canadian National Research Council, Montreal, QC, Canada
- Prof. D. Mantovani, Department of Mining, Metallurgical, and Materials Engineering, Université Laval, Québec, QC, Canada
- Prof. L'H. Yahia, Institut de Génie Biomédical, École Polytechnique de Montréal, Montréal, QC, Canada
- Prof. L. Visai, Department of Molecular Medicine, Università degli Studi di Pavia, Italy
- Prof. L. Rimondini, Department of Life Science, Università del Piemonte Orientale "Amedeo Avogadro", Novara, Italy
- Dr. M. Nava, Istituto Nazionale dei Tumori, Milano (Italy)

COORDINATION AND PARTICIPATION TO RESEARCH PROJECTS

Lina Altomare actively collaborated in different research projects financed by Minister for Education, University and Research (MIUR), Cariplo Foundation, Regione Lombardia and private (non competitive) founding

Responsible of the following research project:

Responsible of Research Unit PRIN project 2017: Advanced injectable nano-composite biomaterials with dual therapeutic/regenerative behaviors for bone cancer (ACTION) PI M. Raucci (CNR Napoli)

Award for Basic Research Activity (MIUR, Italian Minister for Education, University and Research), finanziamento delle attività base di ricerca ai sensi dell'art. 1, commi 295 e seguenti, legge 11 dicembre 2016 n. 232 (gu n. 297 del 21-12-2016 - suppl. ordinario n. 57)

Research contract from Nanosurfaces Industries Srl "INFEZIONE ED ALLERGIA" (INFAL): Sviluppo di una nuova tecnologia con cui funzionalizzare le superfici di dispositivi medici impiantabili per ridurre i rischi di infezione e sintomatologie allergiche da metalli (CUPE98C15000250007)

Collaboration to the following research project:

2016-2019	Collaborator (50%) POR-FESR 2014-2020 Asse I – R&S per Aggregazioni; project *"FAST BREAST CHECK*"; ID 145207;
2010-2014	Collaborator (>70%), FIRB project '*Surface-associated selective transfection'* (RBFR08XH0H)
2012-2014	Collaborator (>50%) Scientific and Technological Cooperation in the areas of Biotechnology and ICT -Sardinia-Lombardy Regions *'ChitoStrip'*

2011-2013	Collaborator, Regione Lombardia POR FESR 2007-2013 *'MANTELLO: Materiali e packaging a MANteminento TErmico per il risparmio energetico nelLa LOgistica e nel trasporto di prodotti alimentari freschi'*
2011-2013	Collaborator (>50%), Caritro Foundation Project '*Development of hybrid degradable stent in magnesium alloy with a polymeric coating for biomedical applications'*
2010-2013	Collaborator, Research Project funded by Foreign Affairs Minister *'Optimisation expérimentale et numérique de biomatériaux métalliques dégradables pour le remplacement et la régénération du tissu vasculaire'*, Scientific Cooperation Italy – Quebec, Laval University, Lab. Biomatériaux et Bioingénierie, Faculté des Sciences et Génie, Québec, Canada, Prof. Diego Mantovani
2008-2011	Collaborator, IIT (NanoBiotechnology) - Research line: *Biosensor and Artificial Bio-system*
2008-2011	Collaborator (>70%), Regione Lombardia Project '*Bioengineerization of tendons and ligaments by using silk fibroin textile structures and adult stem cells'*
2009-2011	Collaborator, INSTM and Regione Lombardia project *'MetaHouse – 'Metamaterials for building'*
2009-2010	Collaborator, Cariplo Foundation Project '*Nano and micro structured polymeric matrices for engineered cardiac proto-tissue'*
2007-2009	Collaborator (>50%), PRIN project '*Design and preparation of biodegradable scaffolds for skeletal muscle regeneration and biocompatibility - biofunctionality evaluation'*
2007-2009	Collaborator (>50%), PRIN project '*Bioinspired HELP (Human Elastin-like Polypeptides)-based nanostructured matrices for regenerative medicine'*

SCIENTIFIC ACTIVITY

The research activity of Lina Altomare is mainly focused on the use of different techniques to fabricate anisotropic constructs. These structures can be used to study and modify cells behavior according to the contact guidance theory [R27]. To this aim, three different fabrication techniques have been investigated: lithographic technique, electrospinning and electrochemical techniques.

- Lithographic techniques

  During tissue formation, skeletal muscle precursor cells fuse together to form multinucleated myotubes. To understand this mechanism, in vitro systems promoting cell alignment need to be developed. Micrometer-scale features obtained by photolithography can be used to control and affect cell behavior [B1]. Differently microgrooved polymeric films have been fabricated by solvent casting of a biodegradable poly-L-lactide/trimethylene carbonate copolymer (PLLA-TMC) onto microgrooved silicon wafers with different groove widths and depths, obtained by a standard photolithographic technique. These microgrooved polymeric films were able to influence myoblasts alignment depending on their dimension and also to affect myotubes formation [R25, R27, C14-C16, P15].

  Another possibility to guide cells alignment is the use of microcontact printing, a soft lithographic technique based on the transfer of a "molecular ink" from an elastomeric stamp to a surface. This method allows the effective attachment of biomolecules in a few seconds on a variety of surfaces with sub-micrometer resolution, without modifying the biomolecules properties. Lina Altomare developed an easy and versatile technique for in vitro production of arrays of skeletal muscle myofibers using microcontact printing technique on biodegradable substrata. Her approach proved to be simple, reliable and effective in obtaining a stable pattern of fibronectin on the PLLA-TMC, moreover fibronectin patterning seems to be a useful method to induce cell alignment and to improve myotube formation [R24, P14].

- Electrospinning

  The electrospinning is a powerful technique, which allows the fabrication of nanostructured scaffolds with randomized or parallel fibers. These topographic cues, and also substrate stiffness, may affect stem cells adhesion, morphology, alignment, proliferation and differentiation. Adipose derived stem cells (ASCs) have attracted considerable interest in regenerative medicine due to their easy isolation, extensive in vitro expandability and ability to differentiate along a number of different tissue-specific lineages. The ASCs adhesion, alignment and differentiation into myogenic lineage on nanofibrous polymeric scaffolds with anisotropic topography, fabricated by electrospinning using polycaprolactone (PCL) and the polycarbonate-urethane ChronoFlex AL-80A (CFAL) have been investigated. Cells expressed myosin (fast skeletal) and tropomyosin in all surface topographies seven days after seeding but myotube formation was only observed on CFAL scaffolds and only few myotubes were formed on PCL scaffolds. Lina Altomare's results contribute to clarify the role of fibers dimensions and fibers orientation on cell behavior with a better myotube formation on CFAL scaffolds [R16, C11, E17].

- Electrochemical/electrophoretic deposition

  Electrochemical deposition is a versatile surface modification technology for the realization of advanced coatings for biomedical applications. Through this technique it is possible to deposit natural polymers such as chitosan on metallic substrata via cathodic polarization. By modifying electrolytic bath composition, voltage and current parameters, cathode used during the process, coating with different morphologies can be obtained depending on gas evolution at the cathode surface that fosters the growth of pores in the deposit coatings. Different coating morphologies, in terms of both pore size and interconnection, can be obtained by changing anion and solution pH. An increase in deposition mass per surface area was always observed when an increase in polarization time and high deposition rates resulted in porous coatings, due to the entrapment of H_2 developed as a consequence of the local reduction processes. With these studies Lina Altomare investigated the possibility of tuning surface morphology of this class of films. This possibility makes her aware of the powerful and versatility of the electrodeposition in designing a new class of medical devices, in which surface assisted tissue engineering approaches can be exploited on conventional metals for the realization of a new class of implantable materials [R20, P8, P10, P12, P13].

Starting from these studies, she tried to exploit the possibility of fabricating different structures based on the electrophoretic deposition not only for surface modification but also to fabricate self-standing scaffolds. Although the feasibility of chitosan electrodeposition was already demonstrated by different research groups, Lina Altomare originally showed the effects of the selection and concentration of anionic species on the morphology of deposited coatings, to obtain porous chitosan films with controlled pore dimension. Electrochemical deposition of chitosan films onto metal substrates has been shown to strongly depend on process parameters (e.g., bath chemical composition and current density). Furthermore, pore interconnection and dimension of prepared films was in the range of interest for tissue engineering scaffolds so that the use of electrochemical deposition appears as an effective technique for the preparation of cellular solids made, more generally, from cationic polymers. The chitosan electrodeposition process has been largely investigated and the possibility of detaching the coatings from the cathode has been exploited together with the possibility of obtaining different patterned morphologies, depending on the geometry of the cathode. Self-standing scaffolds with different porosity have been obtained and also scaffold with different morphologies such as arrays of oriented micro-holes. [R8, R12, C3, C5, P4, P6, P7, P8, E5, E9, E12].

Moreover, the feasibility of one-pot co-deposition with other molecules and/or inorganic materials, broadens the range of new possibilities in the fabrication of advanced coatings and self-standing structures. These findings paved the road for the exploitation of electrochemical deposition of cationic biopolymers in

the innovation of conventional biomedical devices, where chitosan coatings could be used as interface structures, or by an easy peeled-off, in a scaffold based tissue-engineering approach.

- Chitosan:PEO blends with different mechanical and topographic properties have been successfully fabricated in collaboration with the Department of Mechanical Engineering, University of Ottawa. [R11]

- Chitosan: Collagen blends have been also investigated to understand the possibility of fabricating patches for cardiac regeneration, in collaboration with the Fibroblast Reprogramming Unit (Università di Brescia). Mechanical and chemico-physical properties have been successfully modulated by varying the chitosan:collagen ratio and these patches seem to be promising for cardiac regeneration. [C1,C2]

- Chitosan-Bioglass composite have been developed thanks to a collaboration with Professor A. Boccaccini (University of Erlangen-Nuremberg, Germany). The composite have been obtained with different Bioglasses formulations, both standard composition than modified with other ions like Niobium. The latter study has been performed during a master thesis on Biomedical Engineering supervised by Lina Altomare and partially carried out in the laboratory of Prof. Boccaccini. [R1, P1, P2]

- Coatings for bone-contact prostheses with tailored antibacterial properties. This possibility has been investigated in collaboration with the University of Pavia. In [R19] it has been shown a one-pot electrochemical surface modification process for co-deposition of calcium phosphate and gentamicin, with the aim of triggering specific biological responses and imparting antibacterial properties on titanium alloy prostheses. This work paved the way for the direct incorporation of active molecules in Ca-P coatings for bone contact prostheses. [R19, B3, E10]

Natural polymers based structures

Starting from her studies on chitosan electrodeposition, Lina Altomare developed a specific interest in natural polymers for biomedical applications [R3], but also for other industrial applications.

Among natural polymers, cellulose and cellulose–derivative materials find a great interest due to their large availability. These materials have been investigated not only for biomedical applications, but also for aerogels fabrication and packaging:

- Methylcellulose-based thermo-responsive hydrogels have been prepared for cells culture studies. The hydrogels mechanical properties and thermo-reversibility characteristics were investigated by rheological analysis, besides the inversion test was used to determine the gelation temperature. Afterwards, hydrogels cytotoxicity was *in vitro* investigated using mouse fibroblasts [R4, R7, C9, C10, E1]. Methylcellulose has also been used in a bioreactor to mechanically guide 3D mesenchymal stem cell chondrogenesis, in collaboration with Università del Piemonte Orientale, Prof. L. Rimondini and Professor Alini AO Foundaton Davos [R5,, E3, E4]

- Inorganic aerogels were prepared using hydrogels of cellulose nanofibers (CNF) mixed with TiO_2 or TiO_2/SiO_2 aqueous sols. CNF were obtained through the TEMPO-mediated oxidation of cotton cellulose and subsequent calcination. The further calcination of the hybrid materials at suitable temperatures allowed achieving ceramic aerogels able to combine a pronounced adsorption efficiency of organic molecules with photocatalytic activity. The further UV irradiation of the inorganic substrate allowed the fully degradation of the adsorbed dye and the regeneration of the ceramic material. The simplicity of the preparation protocol and the effectiveness in adsorbing-degrading pollutant model molecules make the proposed materials valuable candidates for applications in environmental chemistry. Moreover, the described procedure could be used with

other inorganic precursors in order to prepare ceramic aerogels for applications in catalysis and biomaterial field. [R18, C6]

- Phase Change Materials (PCM) have been incorporated in paperboard and their thermal properties have been investigated. Via a conventional filtration process, it was possible to design and realize composite materials based on cellulose and PCM micro-particles with cold thermal storage ability. Moreover, the heating and cooling process has been predicted a numerical model, by assuming composite material homogeneous in terms of thermal properties. Such model has a fair predictive capability, which is useful when a detailed design and engineering of PCM/cellulose packaging system is required. The proposed design approach, in which material experimental and computational data are integrated, opens the way for a novel class of active packaging for the logistic of perishable products. [R21, C7, E13-E15]

Side Research activities

Surface modifications

- Surfaces functionalization through sol-gel coating.. Sol-gel is an easy and versatile method to chemically modify the material surface to obtain and uniform coatings with a controlled thickness. It also allow to confer specific properties to the material in terms of wettability, roughness and chemical functionalization, in order to elicit the desired cellular response. Sol-gel chemistry has been applied for the functionalization of glass surfaces with different chemistries and variable amounts of thiols to study these groups as mediators of cell adhesion and functions.[P3, P11, E2, E6]

- The use of innovative technologies (namely High Velocity Suspension Flame Spraying, HVSFS) to produce surface modifications, have been carried out in cooperation with University of Modena and Reggio Emilia and the University of Stuttgart (Germany). The high-velocity suspension flame spraying technique (HVSFS) was employed in order to deposit 45S5 [R23] bioactive glass coatings and also hydroxyapatite [R2, R15, E11] onto titanium substrates. The reactivity of the HVSFS-deposited Bioglass coatings seems to be particularly fast, these coatings might therefore be especially useful in those applications where short osseointegration times and progressive resorption of the bioactive layer are required. [R16]. Concerning the HA coatings by HVSFS, the crystallinity can be adjusted from <10% up to 70% without compromising the density and homogeneity of the coating, differently from conventional plasma spraying. Moreover, during immersion in the SBF solution, HA layers with low crystallinity are progressively dissolved and replaced by a new, precipitated hydroxyapatite layer, whereas highly crystalline layers are stable up to 14 days of soaking.

- Study of polymeric coating on biodegradable magnesium alloy stents (MAS). Biodegradable metals could improve long-term clinical results of commercial bare metal or drug-eluting stents. Protective polymer coating is a reasonable way to reduce the degradation rate of Mg alloy. However, the peeling of the coating during stent expansion is the main obstacle in stent application. Experimental and computational methods have been applied to study peeling problem of an optimized MAS design, providing an easy and reliable method to approach peeling problem for Mg alloy stents giving indications for the improvement of their coatings. [R13, R14, C4, P9, E20]

Characterization of biomaterials and biomedical devices[B2]

- Tissue expansion for two-stage breast reconstruction after mastectomy is a safe and effective procedure that can reduce the surgical aggressiveness of reconstructive surgery. The effect of the electromagnetic field of the magnetic resonance (MRI) on breast tissue expanders was investigated

as the field can interfere with the biomedical device, resulting in potential hazards, compromising the diagnosis, or creating artifacts. An experimental protocol was set up to study, *in vitro*, the possible *in vivo* effects of MRI (1.5 tesla) on different breast tissue expanders with incorporated magnetic valves. [C8, E18,]

- Breast implant durability is an important issue among surgeons, patients and regulators. For a silicone gel implant, it is possible to assume that aging begins at the time of implantation and its evaluation is strongly related to shell stiffness, tensile strength and elongation. In this perspective, the evaluation of the effects of the radiation therapy on the properties of explanted breast prostheses has a fundamental importance. As no studies are reported in literature, a new protocol was set up to evaluate *in vitro* the possible effects of radiotherapy on morphological and mechanical properties of not implanted silicone breast implants. [E21]
- Pelvic organ prolapse is one of the most frequently occurring medical conditions in an aging population. Surgical repair of fascial defects using native tissues is the mainstay of therapy, but since native tissues are by definition qualitatively weak, the failure rate is high. To solve this problem, a study was performed to evaluate *in vitro* materials currently used in pelvic floor surgery, to compare, in an in vivo rat model, the inflammatory response, collagen characteristics and mechanical properties of implant materials that are either seeded or not with homologous rat mesenchymal stem cells. [R10]

PUBBLICATIONS

Scientific Papers – Papers in international journal

R1. Ghalayani Esfahani A., Soleimanzade M, Campiglio C.E., Federici A., Altomare L., Draghi L.,. Boccaccini A.R, De Nardo L. Hierarchical Microchannel Architecture in Chitosan/Bioactive Glass Scaffolds via Electrophoretic Deposition Positive-Replica (2019) in press Journal of Biomedical Materials Research: Part A https://doi.org/10.1002/jbm.a.36660

R2. Sergi, R., Bellucci, D., Candidato, R.T., Jr, Lusvarghi, L., Bolelli, G., Pawlowski, L., Candiani, G., Altomare, L., De Nardo, L., Cannillo, V. Bioactive Zn-doped hydroxyapatite coatings and their antibacterial efficacy against Escherichia coli and Staphylococcus aureus (2018) Surface and Coatings Technology, 352, pp. 84-91.

R3. Altomare, L., Bonetti, L., Campiglio, C.E., De Nardo, L., Draghi, L., Tana, F., Farè, S.Biopolymer-based strategies in the design of smart medical devices and artificial organs (2018) International Journal of Artificial Organs,. Article in Press. DOI: 10.1177/0391398818765323 Cited 1 time.

R4. Contessi, N., Altomare, L., Filipponi, A., Farè, S. Thermo-responsive properties of methylcellulose hydrogels for cell sheet engineering (2017) Materials Letters, 207, pp. 157-160. Cited 4 times.

R5. Cochis, A., Grad, S., Stoddart, M.J., Farè, S., Altomare, L., Azzimonti, B., Alini, M., Rimondini, L. Bioreactor mechanically guided 3D mesenchymal stem cell chondrogenesis using a biocompatible novel thermo-reversible methylcellulose-based hydrogel (2017) Scientific Reports, 7, art. no. 45018, . Cited 15 times.

R6. Boccardi, E., Philippart, A., Melli, V., Altomare, L., De Nardo, L., Novajra, G., Vitale-Brovarone, C., Fey, T., Boccaccini, A.R. Bioactivity and Mechanical Stability of 45S5 Bioactive Glass Scaffolds Based on Natural Marine Sponges (2016) Annals of Biomedical Engineering, 44 (6), pp. 1881-1893. Cited 10 times.

R7. Altomare, L., Cochis, A., Carletta, A., Rimondini, L., Farè, S. Thermo-responsive methylcellulose hydrogels as temporary substrate for cell sheet biofabrication (2016) Journal of Materials Science: Materials in Medicine, 27 (5), art. no. 95, . Cited 20 times.

R8. Varoni, E.M., Altomare, L., Cochis, A., Ghalayaniesfahani, A., Cigada, A., Rimondini, L., De Nardo, L. Hierarchic micro-patterned porous scaffolds via electrochemical replica-deposition enhance neo-vascularization (2016) Biomedical Materials (Bristol), 11 (2), art. no. 025018, . Cited 6 times.

R9. Boccardi, E., Melli, V., Catignoli, G., Altomare, L., Jahromi, M.T., Cerruti, M., Lefebvre, L.-P., De Nardo, L. Study of the mechanical stability and bioactivity of Bioglass® based glass-ceramic scaffolds produced via powder metallurgy-inspired technology (2016) Biomedical Materials (Bristol), 11 (1), art. no. 015005, . Cited 9 times.

R10. Spelzini, F., Manodoro, S., Frigerio, M., Nicolini, G., Maggioni, D., Donzelli, E., Altomare, L., Farè, S., Veneziano, F., Avezza, F., Tredici, G., Milani, R. Stem cell augmented mesh materials: an in vitro and in vivo study (2015) International Urogynecology Journal and Pelvic Floor Dysfunction, 26 (5), pp. 675-683. Cited 8 times.

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