

LUIGI DE NARDO
Professional and Scientific CV –2018

PERSONAL INFORMATION

First name/Surname	Luigi De Nardo
Italian Fiscal Number	DNR LGU 78L02 D086F
Birth date, place	2nd July 1978, Cosenza (Italy)
Professional address	Politecnico di Milano, Via Mancinelli 7, 20133 Milano (Italy)
Phone	+39-02-2399-3161
email	luigi.denardo@polimi.it
Nationality	Italian



EDUCATION AND TRAINING

Apr 5 th , 2017	National scientific qualification to function as Full Professor in 09/D1 Sector (Materials Science and Technology). Abilitazione Scientifica Nazionale al ruolo di Professore Ordinario, settore concorsuale 09/D1 (Scienza e tecnologia dei materiali).
Jan 30 th , 2014	National scientific qualification to function as Associate Professor in 09/D1 Sector (Materials Science and Technology). Abilitazione Scientifica Nazionale al ruolo di Professore Associato settore concorsuale 09/D1 (Scienza e tecnologia dei materiali).
Jan-Aug 2009	Visiting Associate. California Institute of Technology, Pasadena (CA, USA). GALCIT Department, c/o Prof. C. Daraio Group
18 May 2007	PhD degree in Materials Engineering. Politecnico di Milano, Milan (Italy), Department of Chemistry, Materials, and Chemical Engineering “G. Natta”. Dissertation: <i>Shape Memory Polymer Foams for Biomedical Applications</i> . Tutor: Prof. A Cigada, Advisors: Prof. MC Tanzi, S Farè <i>Mark: Merito</i>
2004	Italian Professional Engineering Licensure (Abilitazione alla professione di Ingegnere). 1 st Session, Ordine degli Ingegneri di Milano c/o Politecnico di Milano, Milano (Italy)
19 Dec 2003	Master Degree (Laurea quinquennale) in Biomedical Engineering. Politecnico di Milano, Milan (Italy). Bioengineering Department. Thesis: <i>Studio di un poliuretano a memoria di forma (CALOMER). Effetti della sterilizzazione al plasma</i> . Tutor: Prof. MC Tanzi <i>Mark: 99/100</i>
Feb-Aug 2003	Visiting Student, Ecole Polytechnique de Montréal (QC, CA). Groupe de Recherche en Biomecanique et Biomateriaux (GRBB), Prof. L'H Yahia <i>Mark: A+/A</i>
Jul 1997	Diploma (High School Diploma). Liceo Scientifico “G. B. Scorza”, Cosenza (Italy) <i>Mark: 60/60</i>

PRESENT POSITION

5 June 2018- today	Professor in Materials Science and Technology (SC 09/D1, SSD IngInd/22). Politecnico di Milano, Milan (Italy). Department of Chemistry, Materials, and Chemical Engineering “G. Natta”
--------------------	---

PROFESSIONAL EXPERIENCE

- Oct 2014- June 2018 **Associate Professor** in Materials Science and Technology (SC 09/D1, SSD IngInd/22). Politecnico di Milano, Milan (Italy). Department of Chemistry, Materials, and Chemical Engineering "G. Natta"
- Dec 2006 – Oct 2014 **Assistant Professor** in Materials Science and Technology, Politecnico di Milano, Milan (Italy). Department of Chemistry, Materials, and Chemical Engineering "G. Natta"
- Jan 2007 – Oct 2014 **Scientific consultant.** Nanosurfaces s.r.l. (Politecnico di Milano spin off company), Cadriano di Granarolo (Bo, Italy)

AWARDS AND FELLOWSHIPS

- 2013 **Goldman Award for the best basic research.** Varoni EM, Xu J, Cochis A, Chin H, Altomare L, Lodi G, **De Nardo L**, Quinn T, Carrassi A, Rimondini L, Cerruti M. *Multi-layered construct for periodontal regeneration: functional layers for multi-tissue engineering.* XVI International Congress of the Italian Society of Periodontology, Rimini (Italy)
- 2011 **Highlights of 2011** collection of Smart Materials and Structures for the paper *Shape memory polymer cellular solid design for medical applications*, De Nardo L, Bertoldi S, Tanzi MC, Haugen HJ, Farè S, 2011 Smart Mater Struct 20 035004
- 2010 **Best oral presentation.** Young Scientist Forum, National INSTM congress, Padova (Italy)
- 1997 **Alfiere della Repubblica.** Honour from the President of the Italian Republic to the most 20 brilliant students in Italy, Rome (Italy)

ADDITIONAL ACTIVITY

Referee for International Journals

- 2009 - today Acta Biomaterialia (Elsevier Sci. Ltd), ISSN 1742-7061, IF: 4.865
Journal of Applied Biomaterials and Functional Materials FORMER Journal of Applied Biomaterials & Biomechanics (Wichtig Editore), ISSN 2280-8000, IF: 0.761
Journal of Materials Science: Materials in Medicine (Springer), ISSN 0957-4530, IF: 2.316
Materials Science and Engineering C (Elsevier Sci. BV), ISSN 0928-4931, IF: 2.686

Editorial Board

- Jan 2012 - 2018 **Associate Editor.** Journal of Applied Biomaterials and Functional Materials (JAB-FM) FORMER Journal of Applied Biomaterials and Biomechanics (JABB), Wichtig Ed., Milano (Italy)

Referee of National and International Grants

- 2012-Today **Reviewer MIUR** - Ministero dell'Istruzione, dell'Università e della Ricerca (Italy) Preselezione and Selezione PRIN 2012, Progetti Futuro in Ricerca 2013
- 2013 - Today **Reviewer SNSF** - Swiss National Science Foundation (Swiss). Joint research projects (SCOPES), Research Field Engineering sciences, Main Discipline 20505 Material Sciences

Duties in Scientific Societies

2018-today	President of the Committee for Nanomaterials. Ordine degli Ingegneri di Milano, Milano (Italy)
2017 - today	Member of the executive body “Giunta”. INSTM (Consorzio Nazionale di Scienza e Tecnologia dei Materiali), Firenze (Italy)
2014-today	Member of the committee for Nanomaterials. Ordine degli Ingegneri di Milano, Milano (Italy)
2013 - today	Coordinator of the Innovation Group. INSTM (Consorzio Nazionale di Scienza e Tecnologia dei Materiali), Firenze (Italy)
2005-2007	Italian Young Scientist Forum coordinator. Società Italiana Biomateriali (Italy)

Academic Commitments

2018-today	Delegate of the Department Director for the preparation of a Master Degree in Food Engineering at the School for Engineering, Politecnico di Milano, Milano (Italy)
2013-today	Member of the PhD program Committee in Materials Engineering, PhD School, Politecnico di Milano, Milano (Italy)
2012-2013	Member of the PhD program Committee in BioEngineering, PhD School, Politecnico di Milano, Milano (Italy)
2012-13	Member of the committee for writing Department Regulation in accordance with Italian law 240/2010. Department of Chemistry, Materials and Chemical Engineering, Politecnico di Milano (Italy)
2010-12	Member of the executive body (Giunta) of the Department of Chemistry, Materials, and Chemical Engineering “G. Natta”, Politecnico di Milano, Milano (Italy)

INVITED SEMINARS AND LECTURES

July 5 th 2017	Invited Seminar. “Nuovi materiali: trend e opportunità per le imprese”. Assolombarda, Milano, Italy
Oct 12 th 2016	Invited talk. Introduzione alle nanotecnologie. Tutorial – Nanotecnologie e Nanomedicina. Nanoforum , Milano 12/10/2016
Sept 29-Oct 2 nd 2015	Organizing Committee (comitato promotore) Nanoforum 2015. Milano (Italy) and invited talk on “Qualche esempio di applicazione industriale e di opportunità per le aziende”
Sept 16 th 2014	Invited oral presentation (U II.2-5). <i>Electrochemical deposition scaffolding for natural polymers.</i> Symposium U. Bioinspired and Biointegrated Materials as Frontiers Nanomaterials IV. European Materials Research Society (E-MRS) fall Meeting 2014. Warsaw (PL) dal 15-09-2014 al 18-09-2014
Jul 12 th 2013	Università Degli Studi Di Brescia , Brescia (Italy). Dottorato di Ricerca Technology for Health. <i>Smart followers: Intelligent materials for biomedical applications in a biomimetic perspective</i>
Sept 2012	Ecole Polytechnique de Montréal , Montréal (Québec, Canada). Invited by Prof. L'Hocine Yahia, <i>Smart Materials for Medical Applications</i>
May 17 th 2011	Confindustria Bergamo , Bergamo (Italy). <i>Nuovi trattamenti per i rivestimenti nautici</i>
Apr 28 th 2011	Confindustria Bergamo , Bergamo (Italy). <i>Le ultime frontiere dell'isolamento acustico: il progetto SPARR. Settore aerospazio</i>
June 16 th , 2010	Nanoforum Torino , Torino (Italy). <i>Advanced Materials and Solutions for Packaging</i>

Jul 12th-18th, 2010

16 Scuola AIMAT-SIB. School of Bio- Nano- Meta-materials: "Le piattaforme tecnologiche disponibili", Ischia Porto, Napoli (Italy). *Metamaterials*

AFFILIATIONS

2009-today	Member of AIMAT – Italian society for Materials Engineering (Associazione Italiana di Ingegneria dei Materiali)
2005-today	Member of European Society of Biomaterials, ESB
2009-today	Member of Interuniversity Consortium for Materials Science and Engineering (Consorzio Interuniveritario Nazionale per la Scienza e la Tecnologia dei Materiali, INSTM)

TEACHING ACTIVITY

Courses at Master and Bachelor level

A.Y. 2017/18	Professor of Food Packaging Materials (Code 051191, 5 CFU). Master in Chemical Engineering, Politecnico di Milano.
A.Y. 2017/18	Professor of Materials Technology for Fashion (Code 051206, 3 CFU). Final Studio of Fashion Design (laboratorio di sintesi finale - knitwear design). Bachelor in Fashion Design, Politecnico di Milano.
A.Y. 2017/18	Professor of Materials for Design (098315 – General properties of Materials, 098316 – Applications of materials in design, 6 CFU). Integrated course 098314, Bachelor in Fashion Design (Materiali per il design, Moda), Politecnico di Milano.
A.Y. 2016/17	Professor of Microbiology in process and product engineerings (Code 099303, 5 CFU). Master in Chemical Engineering, Politecnico di Milano.
A.Y. 2016/17	Professor of Materials Technology for Fashion (Code 089853, 2 CFU). Final Studio of Fashion Design (laboratorio di sintesi finale - knitwear design). Bachelor in Fashion Design, Politecnico di Milano.
A.Y. 2016/17	Professor of Materials for Design (098315 – General properties of Materials, 098316 – Applications of materials in design, 6 CFU). Integrated course 098314, Bachelor in Fashion Design (Materiali per il design, Moda), Politecnico di Milano.
A.Y. 2015/16	Professor of Chemical Bioengineering (Code 086026, 5 CFU). Bachelor in Biomedical Engineering, Politecnico di Milano.
A.Y. 2015/16	Professor of Materials Technology for Fashion (Code 089853, 2 CFU). Final Studio of Fashion Design (laboratorio di sintesi finale - knitwear design). Bachelor in Fashion Design, Politecnico di Milano.
A.Y. 2015/16	Professor of Materials for Design (098315 – General properties of Materials, 098316 – Applications of materials in design, 6 CFU). Integrated course, Bachelor in Fashion Design (Materiali per il design, Moda), Politecnico di Milano.
A.Y. 2015/16	Professor of Process and Materials Innovation in Fashion Design (096161, 3 CFU). Master degree in Fashion Design (Materiali per il design, Moda), Politecnico di Milano.
A.Y. 2014/15	Professor of Materials Technology for Fashion (Code 089853, 2 CFU). Final Studio of Fashion Design (laboratorio di sintesi finale - knitwear design). Bachelor in Fashion Design, Politecnico di Milano.
A.Y. 2014/15	Professor of Science and Technology of Materials (Code 093229, 5 CFU). Integrated course Materials for Design, Fashion (Materiali per il design, Moda). Politecnico di Milano, 1st year Bachelor in Fashion Design.

- A.Y. 2014/15 **Professor Applications of Materials in Design** (Code 083814, 2 CFU each course, 2 courses). Integrated course Materials for Interior Design (Materiali per il design degli Interni). Politecnico di Milano, 1st year Bachelor in Interior Design.
- A.Y. 2013/14 **Professor of Materials Technology for Fashion** (Code 089853, 2 CFU). Final Studio of Fashion Design (laboratorio di sintesi finale - knitwear design). Bachelor in Fashion Design, Politecnico di Milano.
- A.Y. 2013/14 **Professor of Science and Technology of Materials** (Code 093229, 5 CFU). Integrated course Materials for Design, Fashion (Materiali per il design, Moda). Politecnico di Milano, 1st year Bachelor in Fashion Design.
- A.Y. 2013/14 **Professor Applications of Materials in Design** (Code 083814, 2 CFU each course, 2 courses). Integrated course Materials for Interior Design (Materiali per il design degli Interni). Politecnico di Milano, 1st year Bachelor in Interior Design.
- A.Y. 2012/13 **Professor of Science and Technology of Materials** (Code 093229, 5 CFU). Integrated course Materials for Design, Fashion (Materiali per il design, Moda). Politecnico di Milano, 1st year Bachelor in Fashion Design.
- A.Y. 2012/13 **Professor of Applications of Materials in Design** (Code 083814, 2 CFU each course, 2 Courses). Integrated course Materials for Interior Design (Materiali per il design degli Interni). Politecnico di Milano, 1st year Bachelor in Interior Design.
- A.Y. 2011/12 **Professor of Applications of Materials in Fashion Design** (Code 083814, 2 CFU). Integrated course Materials for Design, Fashion (Materiali per il design, Moda). Politecnico di Milano, 1st year Bachelor in Fashion Design.
- A.Y. 2011/12 **Professor of Materials Science** (Code 083811, 3CFU). Integrated course Materials for Design, Fashion (Materiali per il design, Moda). Politecnico di Milano, 1st year Bachelor in Fashion Design.
- A.Y. 2010/11 **Professor of Applications of Materials in Fashion Design** (Code 083814, 2CFU). Integrated course Materials for Design, Fashion (Materiali per il design, Moda). Politecnico di Milano, 1st year Bachelor in Fashion Design.
- A.Y. 2010/11 **Professor of Materials Science** (Code 083811, 3CFU). Integrated course Materials for Design, Fashion (Materiali per il design, Moda). Politecnico di Milano, 1st year Bachelor in Fashion Design.
- A.Y. 2009/10 **Professor of Applications of Materials in Fashion Design** (Code 083814, 2CFU). Integrated course Materials for Design, Fashion (Materiali per il design, Moda). Politecnico di Milano, 1st year Bachelor in Fashion Design.
- A.Y. 2009/10 **Professor of Materials Science** (Code 083811, 3CFU). Integrated course Materials for Design, Fashion (Materiali per il design, Moda). Politecnico di Milano, 1st year Bachelor in Fashion Design.
- A.Y. 2008/09 **Professor of Materials Science** (Code 083811, 3CFU). Integrated course Materials for Design, Fashion (Materiali per il design, Moda). Politecnico di Milano, 1st year Bachelor in Fashion Design.
- A.Y. 2007/08 **Professor of Materials Science** (Code 023492, 2.5CFU). Integrated course Materials for Design, Fashion (Materiali per il design, Moda). Politecnico di Milano, 1st year Bachelor in Fashion Design.
- A.Y. 2007/08 **Professor of Materials Technologies for Industrial Design II** (Code 074247, 2.5CFU). Integrated course Materials and Technologies, Interior Design. Politecnico di Milano, 2nd year Master in Interior Design, Como.

Practical Activity and Seminars

A.Y. 2007/08	Teacher Assistant – Practicals and workshops. Professor Alberto Cigada, Course of Materials Science (2.5CFU for 2 Classes 2). Integrated course Materials for Design, Product Design (Materiali per il design, Moda). Politecnico di Milano, 1st year Bachelor in Product Design.
A.Y. 2006/07	Teacher Assistant – Practicals and workshops. Professor Alberto Cigada, Course of Materials Science (2.5CFU). Integrated course Materials for Design, Fashion (Materiali per il design, Moda). Politecnico di Milano, 1st year Bachelor in Fashion Design.
A.Y. 2006/07	Teacher Assistant – Practicals and workshops. Professor Alberto Cigada, Course of Materials Science (2.5CFU for 2 Classes 2). Integrated course Materials for Design, Product Design (Materiali per il design, Moda). Politecnico di Milano, 1st year Bachelor in Product Design.
A.Y. 2005/06	Teacher Assistant – Practicals and workshops. Professor Alberto Cigada, Course of Materials Science (2.5CFU). Integrated course Materials for Design, Fashion (Materiali per il design, Moda). Politecnico di Milano, 1st year Bachelor in Fashion Design.
A.Y. 2005/06	Teacher Assistant – Practicals and workshops. Professor Alberto Cigada, Course of Materials Science (2.5CFU for 2 Classes 2). Integrated course Materials for Design, Product Design (Materiali per il design, Prodotto). Politecnico di Milano, 1 st year Bachelor in Product Design.
A.Y. 2005/06	Teacher Assistant – Practicals and workshops. Professor Lorenza Draghi, Course of Industrial Design. Course of Materials for Industrial Design (Materiali per il design industriale). Università IUAV (Venezia), 2 nd year Bachelor in Industrial Design.
A.Y. 2004/05	Collaborator in the course Biomateriali III + Strutture Bioartificiali e Biomimetiche (Biomaterials III + Bioartificial and Biomimetic structures). Prof. Maria Cristina Tanzi, Politecnico di Milano, Master in Biomedical Engineering (Laurea Magistrale). Practicals and workshop.
A.Y. 2003/04	Collaborator in the course Biomateriali III + Strutture Bioartificiali e Biomimetiche (Biomaterials III + Bioartificial and Biomimetic structures). Prof. Maria Cristina Tanzi, Politecnico di Milano, Master in Biomedical Engineering (Laurea Magistrale). Practicals and workshop.

Thesis and PhD dissertation supervisor

2004-today	Supervisor or co-supervisor in Master Thesis in Materials Engineering, Biomedical Engineering, Design, Design and Engineering, Politecnico di Milano.
2009-today	Supervisor or co-supervisor in Bachelor Thesis in Biomedical Engineering, Politecnico di Milano.
2010-today	Supervisor of PhD students in Materials Engineering PhD program.

SCIENTIFIC ACTIVITY

Luigi De Nardo (LDN) started his research activity in 2003 at the Laboratory of Biomaterials (Politecnico di Milano, department of Bioengineering) -as MSc student- and at the Laboratory of Innovation and Analysis of Bioperformances (Ecole Polytechnique of Montreal (Qc, CA)) -as visiting student- He pursued his PhD studies at Politecnico di Milano.

After graduation, he started his research at the department of Chemistry, Materials and Chemical Engineering of Politecnico di Milano and spent as visiting associate 6 months at Caltech. During these 14 years, research activities of LDN have been devoted to:

- i. Understanding fundamental properties of stimulus-responsive materials, as platform to design innovative industrial solutions

- ii. Tailoring surface properties of materials, in the context of materials selection and durability problems
- iii. Processing material structure with a multiscale approach to tune final material properties

Stimuli-responsive materials as a platform to design innovative industrial solutions

As Master and PhD student, LDN work was focused on Shape Memory Polymers (SMPs), a promising, and at that time completely new, class of functional materials. Shape-memory materials (SMMs) are fascinating materials that possess the ability to recover considerable – apparently plastic – deformations upon exposure to an appropriate external stimulus.

LDN works contributed to:

- i. **Development of a platform for 3D cellular solids for Biomedical applications** [SP14,15; A14,23,33,36-38,40,41; B2,7]. LDN originally demonstrated that a correct coupling of polymer transformation processes and material selection allows to obtain SMP-based porous structures with a broad spectrum of morphological properties, resulting in tunable thermo-mechanical and shape recovery ability. The variety of processing studied and the obtained SMP foam properties offer a broad range of properties that can be effectively used in the design of novel devices for minimally invasive surgical procedures [SP14,15]. Because the impact of the results, LDN has been invited to publish 2 reviews on the subject.
- ii. **Assessment of key aspects for minimally invasive devices design.** LDN contributed to the fundamental characterization of SMPs as fillers for embolization procedures [SP15] in a long-term cooperation with prof. Yahia, Ecole Polytechnique de Montreal (Montreal, Canada). He performed the characterization of commercial SMP foams (Cold Hibernated Elastic Memory, CHEM), contributing to the definition of materials properties and specific characterization techniques. All these results confirm the possibility of using Shape Memory Polymer foams as material for the realization of aneurysm fillers, allowing their use for subsequent in vivo tests by the prof. Yahia.
- iii. **Effects of some innovative sterilization techniques** on material properties. Plasma and ozone sterilizations have been a former interest of research [A37,38]. LDN contributed to clarify that the material/device/sterilization interaction has to be taken into account when innovation in each component of this trio is proposed. Moreover, the comparison with previous published researches opened new challenges in understanding the role of sterilization-induced degradation mechanisms on biological interactions with polymer scaffolds.

Based on SMP studies, Luigi De Nardo research evolved toward the use of phase transitions in the design of advanced smart systems, reaching innovative results in the exploitation of:

- i. **Phase transitions to design materials for energy storage** [SP11, A28]. Luigi De Nardo reported an easy technique for Phase Change Materials incorporation in paperboard and their physical evaluation in terms of thermal properties. The proposed design approach, in which material experimental and computational data are integrated, paved the way for a novel class of active packaging for the logistic of perishable products.
- ii. **pH-responsive biopolymers to design hierarchical 3D structures and surfaces** [SP3,5,10; A6,8,10-13,21,22,26; B4]. LDN proposed electrochemical deposition of biopolymers via cathodic polarization as a simple and rapid technique for either surface modifications or scaffolding technology. Although the feasibility of chitosan cathodic deposition was already demonstrated by different research groups, LDN originally showed that the use of pH-responsive biopolymers via electrochemical deposition allows the preparation of cellular solids useful for the innovation in design of conventional biomedical devices. LDN also proposed, with an original approach, the use of cathodic deposition with positive replica to micro-pattern structures with controlled lattice of porosity. This approach has been patented [P2,3]. Moreover, his approach has been used to provide materials and structures for gene delivery, drug delivery, support for the regeneration to different research groups.

Tailoring surface properties of materials in the context of materials selection and durability

Luigi De Nardo developed a specific interest in tailoring surface properties since the original studies on the effects of sterilization techniques on surface modifications of SMPs. These studies opened a wider interest in terms of materials, processing technologies, and characterization techniques, devoted to **study and develop surface modifications aimed to:**

- i. **Improve contact response in medical devices [SP8; A18,32].** Luigi De Nardo focused his interest towards the use of innovative technologies (namely, HVSFS High Velocity Suspension Flame Spraying) in surface modifications of medical devices with active coatings, 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 to deposit 45S5 bioactive glass coatings onto titanium substrates: these coatings have found useful in applications where fast osseointegration and resorption of the bioactive layer are required.
- ii. **Improve response in device-related infections (DRIs) [SP2,9; A20,21,25,31,39; B4,5].** Device-related infections (DRIs) due to bacterial colonization and proliferation represent a major issue of both short-term devices and implantable prostheses: a promising therapy is represented by the design of device surface properties aimed at locally modulating interfacial interactions between implanted devices and host tissues. The modulation of device properties via chemical composition and structure modification of the surface represents the focus of ongoing research projects of LDN, aimed at improving current bulk biomaterials. Namely, Luigi De Nardo proposed different approaches:
 - a. a simple and effective way to introduce antibacterial agents via electrochemical process
 - b. The use of TiO₂ surfaces obtained via sol gel technology: a part of these results has not been subject to publications, but transferred to NextMaterials, a spin off company
 - c. Conventional chemical surface modifications
- iii. **Improve durability in commodity industrial materials via surface nanostructure of metal oxides and develop specific diagnostic techniques [SP1; A1,3,4,20,25; B4,5].** Tuning the properties of metal oxides at nanoscale has become a main scientific interest of LDN in the last 3 years, his research activity being based on sol gel synthesis of different classes of oxides (TiO₂, ZrO₂, SiO₂ and their combination). Such an approach has been efficiently used for the functionalization of either polymers, metals, or complex structures (i.e. aerogels), allowing to impart them aesthetic attributes or functional properties. Moreover, LDN work contributed to the elucidation of the industrial environments and characterization techniques to predict the durability of commodity materials, in a framework of cooperation with major professional food appliance manufacturers.
- iv. **Active packaging [SP2; A5].** The interest in active packaging is a new and specific research activity that LDN started in recent years. Food Packaging represents a brand-new research line based on his teaching duties at Politecnico di Milano. LDN originally showed the possibility of incorporating active antioxidants in different classes of metal oxides (TiO₂, ZrO₂, SiO₂ and their combination) via sol gel approach and their effective activity as antioxidant solutions in active packaging.

Processing material structure with a multiscale approach to tune final material properties

The study of cellular solids in SMPs paved the way for the more fundamental research interests of Luigi De Nardo in the study of relationship between material structure and properties. Along this direction, he studied the influence of microstructural aspects –mainly related to innovative manufacturing processing- of **new classes of cellular solids:**

- i. **Carbon Nanotube foams [SP7,12; A15,16,27,30].** LDN, in cooperation with Prof. Chiara Daraio at California Institute of Technology, contributed to the design, fabrication, and testing of new lightweight multilayer materials for energy absorption, based on alternating layers of aligned carbon nanotubes and polymer (PDMS). These materials show excellent energy-absorbing ability and present localized deformation within the individual layers composing the structure. These studies supported the use of bulk CNT-based structures as building blocks for high strength, low-density, energy absorbing materials; Moreover, they demonstrated the structural architecture plays a fundamental role in determining energy absorption, peak stress, and deformation recovery.

- ii. **Ceramic adsorbents with photocatalytic properties based on metal oxides [SP9].** Inorganic aerogels were prepared using hydrogels of cellulose nanofibres (CNF) mixed with TiO₂ or TiO₂/SiO₂ aqueous sols. The simplicity of the preparation protocol and the effectiveness in adsorbing-degrading pollutant model molecules are characteristics that make the proposed materials as valuable candidate 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.
- iii. **Glass-ceramic produced via powder metallurgy and ceramic for bone contact materials [A2,7,17,21].** LDN established a strong network of cooperation with National Research Center in Canada to study an innovative technology for the preparation of cellular solids made in Bioglass for orthopedic applications, elucidating the role of nucleation of crystalline phases in glass ceramic structure and their evolution in relevant environments.

The correlation between microstructure, processing, and materials performance has been the subject also of a promising research activity in cooperation with cooperation with SAMO Biomedica, an Italian Manufacturer of prostheses (Now Nanosurfaces Industries, Bologna). Industrial manufacturing of prosthesis components could take significant advantage by the introduction of new, cost-effective manufacturing technologies with near net-shape capabilities. Among them, metal injection molding (MIM) appears particularly promising for the production of orthopedic arthroplasty components with significant cost saving. Luigi De Nardo the effects on electrochemical properties, ion release, and in vitro response of medical grade CoCrMo alloy processed via MIM compared to conventional processes [SP6; A9,19]. The main results of this research confirmed the potential of using innovative processing technology for the production of components of implantable devices with increased durability.

Side research activities

Understanding the mechanical interaction between tissues and (Bio)materials [SP13; A24,29,34,35]

The problem of studying the interaction between multilayer materials represents a critical aspect in several industrial applications, also when dealing with complex interfaces as biomaterials. Luigi De Nardo established a strong network of international cooperation involving groups from California Institute of Technology, University of Pittsburgh and University of California, Los Angeles. The starting point has been the application of theoretical and experimental instruments developed by prof. Daraio on solitons in granular chains [SP13]. LDN contributed to apply this theory to biomaterials/tissue interactions by performing a detailed investigation of the interaction of highly nonlinear solitary waves with linear elastic media. He also contributed to further propose a new biomedical sensing technique based on highly nonlinear solitary waves to assess orthopaedic implant stability in a nondestructive and efficient manner, in a cooperation framework with California Institute of Technology and University of California, Los Angeles. [A24,29,34,35]

Other side research activities

In addition, other research activities have been carried out, even if not documented by scientific papers for IP aspects:

- Design and fabrication of surface coatings, based on sol-gel technology, for thermal break inserting thermoplastic profiles aimed at improving adhesion of paints
- Design, testing, and scale up of chemical surface modifications for lighting systems based on TiO₂ sol gel
- Implementation of Materials selection tools for Biomedical and Industrial Design sectors

Dissemination

Luigi De Nardo is co-author of several publications in Materials Science and Technology, the main being indexed in publication databases ISI, SCOPUS:

- **Web of Science (ISI, 3 Feb 2018)**
 - 47 original publications
 - H_{index} = 14

- Number of citations = 538
- **Scopus (3 Feb 2018)**
 - AU-ID ("De Nardo, Luigi" 35948045700) AND AU-ID ("De Nardo, Luigi" 5719670066535
 - 54 original publications
 - $H_{index} = 15$
 - Number of citations = 640

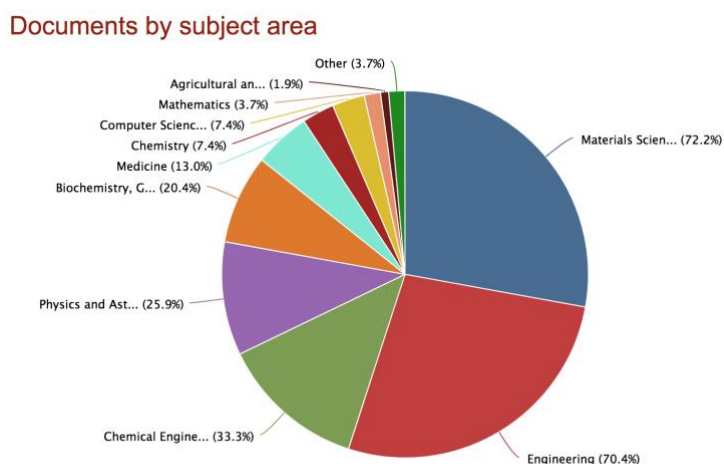


Figure 1. Distribution of research areas of Luigi De Nardo. Source SCOPUS.

A significant trend of increasing of number of publications and citations has been registered starting 2010. These publications concern mainly area of Materials Science, Materials Engineering and Biomaterials, as indicated by the analysis of research publications of Luigi De Nardo using SCOPUS (Figure 1).

He is also co-inventor of 3 applications for national or international patents related to the surface modifications of materials intended for medical and industrial applications. He presented his scientific results, related to smart and functional materials in medicine and other industrial applications in several oral and poster communications (more than 50) at national and international meetings.

FUNDING

*Luigi De Nardo Actively participated to different National and International calls on materials science and technology. In the following only competitive grants in which he had a **direct responsibility** are reported. Non-competitive (private funding) are also reported.*

Competitive grants

2017-Today

Co-Principal Scientific Investigator. "FastBreastCheck" (REGIONE LOMBARDIA PROGRAMMA OPERATIVO REGIONALE 2014-2020. OBIETTIVO "INVESTIMENTI IN FAVORE DELLA CRESCITA E DELL'OCCUPAZIONE" (cofinanziato con il FESR). ASSE PRIORITARIO I – RAFFORZARE LA RICERCA, LO SVILUPPO E L'INNOVAZIONE Azione I.1.b.1.3 - Sostegno alle attività collaborative di R&S per lo sviluppo di nuove tecnologie sostenibili, di nuovi prodotti e servizi. BANDO LINEA R&S PER AGGREGAZIONI

2017-Today

Principal Scientific Investigator. "GRATA" (GRATA GRAFENE PER IL TESSILE AVANZATO E LA MODA ID 187056 Avalere sul bandoSmart

fashion and Design POR FESR 2014-2020 Asse I D.d.u.o. n 3169 del 11 aprile 2016 CUP E88I16000120002). Regione Lombardia.

- 01/10/2016 – Today **Participant and responsible of WP.** "Attività di Ricerca a supporto del progetto Greenrail". SME Instrument Phase 2 - "Greenrail, innovative and sustainable railway sleepers: the greener solution for railway sector", finanziato dalla Comunità Europea (**H2020 SME Instrument Phase 2– Grant Agreement No: 738373 Società Greenrail**).
- 2011-2013 **CoPi** progetto PACKAGING ATTIVO PER I PRODOTTI ORTOFRUTTICOLI (D.M. n. 29472 del 28/12/2010). Progetto Speciale di Ricerca Ministero delle politiche agricole alimentari e forestali (ai sensi dell'art. 4 della legge 23 dicembre 1999, n. 499) Referenti di Progetto: Prof. Luigi De Nardo, Prof. Barbara Del Curto Coordinatore del progetto: Prof. Alberto Cigada dal 19-01-2011 al 31-01-2013
- 2010-2014 **Participant and responsible of WP.** FIRB (Fund for Investments in Basic Research) - Call "Future in research" 2008. SAST i. SAST - Surface-associated selective transfection project co-financed by MIUR in 2010 (RBF08XH0H_001)
PI: Gabriele Candiani, Politecnico di Milano (Italy)
Duration: 3 y
Total amount: 656,000 €
- 2010-12 **Principal Investigator.** AM "Materiali Polimerici intelligenti per applicazioni biomediche. Ministero Affari Esteri Italia (Sottocommissione VII Mista Quebec Italia)
CoPi: L'H. Yahia, Ecole Polytechnique de Montreal (Montreal, QC, Canada)
Duration: 3 y
Total amount: 6 mobility bourses
- 2010-11 **Principal Investigator.** SURF. Surface treatments for nautics. Programma Regione Lombardia Driade, Asse 1, Azione 1.1. DAFNE
Duration: 2 y
Total amount: Gross 700,000 €
- 2010-11 **Principal Investigator.** SPARR. Systems and materials for noise reduction. Programma Regione Lombardia Driade, Asse 1, Azione 1.1. DAFNE.
Duration: 2 y
Total amount: Gross 700,000 €
- 2009-11 **Principal Investigator.** META-Home – Metamaterials for building. INSTM (Firenze, Italy)
Duration: 2 y
Total amount: Gross 140,000 €

National and International Industrial funding

- 2015-2017 **Principal Investigator.** Research program with Luxottica srl.
Duration: 3 y
Total amount: gross 140,000 €
- 2014-2017 **Principal Investigator.** PhD bourse from Electrolux Professional (Pordenone, Italy). Program in order to develop common industrial research activity
Duration: 3 y
Total amount: 70,000 €
- 2013-14 **Principal Investigator.** Contract to develop materials for HiChest project. Whirlpool Italia (Siena, Italy). Via INSTM
Duration: 2 y
Total amount: 60,000 €

- 2012-2014 **Principal Investigator.** Technoform Bautech (Lainate, Milano, Italy) Program in order to develop common industrial research activity on surface modification
Duration: 2 y
Total amount: 50,000 €
- 2012-2014 **Principal Investigator.** Technoform Bautech (Lainate, Milano, Italy) Program in order to develop common industrial research activity on surface modification
Duration: 2 y
Total amount: 50,000 €
- 2010-2011 **Principal Investigator.** Tecnoelettrica Brianza (Milano, Italy) Program in order to develop surface modifications for lighting systems
Duration: 2 y
Total amount: 50,000 €

RESEARCH ACTIVITY IN INTERNATIONAL RESEARCH INSTITUTES

- Feb-Aug 2003 **Laboratory of Innovation and Analysis of Bioperformances, Ecole Polytechnique of Montreal (Qc, CA).**
As a visiting student for Master Degree, Luigi De Nardo was in charge of studies on functional materials for biomedical applications, namely shape memory polymers (SMPs). The researches on such class of materials have been devoted to evaluate the main chemico-physical, thermo-mechanical and biological interaction properties and their possible applications in biomedical devices design. These studies were accompanied by the assessment of key aspects for minimally invasive devices design. He also contributed to the assessment of the main issues of these materials in biomaterials science: e. g. effects of some innovative sterilization techniques on material properties (Plasma, ozone), stability in quasi-physiological environments.
- Feb-Aug 2009 **California Institute of Technology (Pasadena, CA, USA). Laboratory of Prof. C. Daraio.**
As visiting associate, Luigi De Nardo contributed to the research activities in two main fields: i. Study of Nanostructured materials for energy adsorption. ii. Application of non-linear solitary waves from granular materials in detection of medical prostheses stability and prostheses/tissue interfaces.

PRESENT AND PAST SCIENTIFIC COLLABORATION

National and International Industries

- **Electrolux Professional**, Pordenone, ITALY
- **Gimac**, Castronno, Varese, ITALY
- **LIMA Corporate**, San Daniele del Friuli, Udine, ITALY
- **Luxottica**, Agordo, Belluno, ITALY
- **Mitsubishi Heavy Industries LTD**, Nagoya R&D Center, JAPAN
- **Nanosurfaces srl**, Cadriano di Granarolo Emilia, Bologna, ITALY
- **NextMaterials srl**, Milano, ITALY
- **Plan1Health s.r.l.**, Villanova di S. Daniele del Friuli, Udine, ITALY
- **Polymer Technology Group**, Berkeley, California, USA
- **SAMO Biomedica SpA**, Cadriano di Granarolo Emilia, Bologna, ITALY

National and International Universities and Research Centers

- **Prof. C. Daraio**, ETH Zurich (Swiss) FORMER California Institute of Technology, Pasadena (CA, USA)
- **Prof. P. Rizzo**, University of Pittsburgh, Pittsburgh (PA, USA)
- **Prof. L'H. Yahia**, École Polytechnique de Montréal, Montréal (QC, Canada)

- **Prof. F. Billi**, University of California Los Angeles (UCLA), Los Angeles (CA, USA)
- **Prof. E. Ebramzadeh**, University of California Los Angeles (UCLA), Los Angeles (CA, USA)
- **Prof. M. Cerruti**, McGill University, Montréal QC, Canada
- **Prof. F. Variola**, University of Ottawa, Ottawa (Canada)
- **Dr. L.-P. Lefebvre**, Canadian National Research Council, Montreal (QC, Canada)
- **Prof. L. Visai**, Department of Biochemistry, Università degli Studi di Pavia, Italy
- **Prof. T. Valente**, Università di Roma “La Sapienza”, Roma (Italy)
- **Prof. T. Manfredini**, Università di Modena e Reggio Emilia, Modena (Italy)
- **Prof. A. Montenero and Prof. F. Bondioli**, Università di Parma, Parma (Italy)
- **Prof. P. Fino**, Politecnico di Torino, Torino (Italy)
- **Prof. P. Dell’Era**, Università di Brescia, Brescia (Italy)

Milan, February 7th 2018

Signature
Luigi De Nardo

COMPLETE LIST OF PUBLICATIONS

Scientific Papers – Papers in international journals

- A.1 Basso M, Simonato M, Furlanetto R, De Nardo L. Study of chemical environments for washing and descaling of food processing appliances: An insight in commercial cleaning products. *Journal of Industrial and Engineering Chemistry* **2017**;53:23-36. DOI: 10.1016/j.jiec.2017.03.041
- A.2 Melli V, Lefebvre L-P, Lenci M, Mondon M, Sao-Joao S, Cigada A, Delafosse D, De Nardo L. Resorbability of a Bioglass®-based glass-ceramic scaffold produced via a powder metallurgy approach. *Ceramics International* **2017**;43(12):8625-8635 DOI: 10.1016/j.ceramint.2017.03.176
- A.3 Tana F, Messori M, Contini D, Cigada A, Valente T, Variola F, De Nardo L, Bondioli F. Synthesis and characterization of scratch-resistant hybrid coatings based on non-hydrolytic sol-gel ZrO₂ nanoparticles. *Progress in Organic Coatings* **2017**;103:60-68 DOI: 10.1016/j.porgcoat.2016.11.022
- A.4 Piselli A, Basso M, Simonato M, Furlanetto R, Cigada A, De Nardo L, Del Curto B. Effect of wear from cleaning operations on sintered ceramic surfaces: Correlation of surface properties data with touch perception and digital image processing. *Wear* **2017**;390-391:355-366. DOI: 10.1016/j.wear.2017.09.003
- A.5 Bossi E, Tana F, Punta C, Cigada A, De Nardo L. Flexible hybrid coatings with efficient antioxidation properties. *Food Packaging and Shelf Life* **2016**;10:106-114. DOI: 10.1016/j.fpsl.2016.10.002
- A.6 Varoni EM, 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. *Biomedical Materials* **2016**;11(2): 025018 DOI: 10.1088/1748-6041/11/2/025018
- A.7 Boccardi E, Melli V, Catignoli G, Altomare L, Jahromi MT, 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. *Biomedical Materials* **2016**;11(1): 015005 DOI: 10.1088/1748-6041/11/1/015005
- A.8 Benzoni P, Ginestra P, Altomare L, Fiorentino A, De Nardo L, Ceretti E, Dell'Era P. Biomufacturing of a Chitosan/Collagen Scaffold to Drive Adhesion and Alignment of Human Cardiomyocyte Derived from Stem Cells. *Procedia CIRP* **2016**;49:113-120 DOI: 10.1016/j.procir.2015.09.004
- A.9 Melli V, Juszczak M, Sandrini E, Bolelli G, Bonferroni B, Lusvarghi L, Cigada A, Manfredini T, De Nardo L. Tribological and mechanical performance evaluation of metal prosthesis components manufactured via metal injection molding. *Journal of Materials Science: Materials in Medicine* **2015**;26(1):1-11 DOI: 10.1007/s10856-014-5332-z
- A.10 Malloggi C, Pezzoli D, Magagnin L, De Nardo L, Mantovani D, Tallarita E, Candiani G. Comparative evaluation and optimization of off-the-shelf cationic polymers for gene delivery purposes. *Polymer Chemistry* **2015**;6(35):6325-6339 DOI: 10.1039/c5py00915d
- A.11 Cassani DAD, Altomare L, De Nardo L, Variola F. Physicochemical and nanomechanical investigation of electrodeposited chitosan:PEO blends. *Journal of Materials Chemistry B* **2015**; 3(13):2641-2650 DOI: 10.1039/c4tb02044h
- A.12 Altomare L, Guglielmo E, Varoni EM, Bertoldi S, Cochis A, Rimondini L, De Nardo L. Design of 2D chitosan scaffolds via electrochemical structuring. *BioMatter* **2015**;4(5):e29506 DOI: 10.4161/biom.29506
- A.13 Altomare L, Bertoldi S, Montorsi M, Candiani G, Cigada A, **De Nardo L**. Optimization of chitosan-based scaffolds obtained via cathodic polarization. *Key Engineering Materials* **2015**; 654:154-158 DOI: 10.4028/www.scientific.net/KEM.654.154
- A.14 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 and Functional Materials* **2015**;13(1):1-9 DOI: 10.5301/jabfm.5000184
- A.15 Lattanzi L, Thevamaran R, De Nardo L, Daraio C. Dynamic Behavior of Vertically Aligned Carbon Nanotube Foams with Patterned Microstructure. *Advanced Engineering Materials* **2015**;17(10):1470-1479 DOI: 10.1002/adem.201400571

- A.16 Lattanzi L, **De Nardo L**, Raney JR, Daraio C. *Geometry-induced mechanical properties of carbon nanotube foams*. *Advanced Engineering Materials* **2014**;16(8):1026-1031 DOI: 10.1002/adem.201300524:
- A.17 Vecbiskena L, **De Nardo L**, Chiesa R. *Nanostructured calcium phosphates for biomedical applications*. *Key Engineering Materials* **2014**;604:212-215 ISSN: 10139826 ISBN: 978-303835043-9 DOI: 10.4028/www.scientific.net/KEM.604.212
- A.18 Bolelli G, Bellucci D, Cannillo V, Lusvarghi L, Sola A, Stiegler N, Müller P, Killinger A, Gadow R, Altomare L, **De Nardo L**. *Suspension thermal spraying of hydroxyapatite: Microstructure and in vitro behavior*. *Materials Science and Engineering C* **2014**;34(1):287-303 DOI: 10.1016/j.msec.2013.09.017
- A.19 Melli V, Rondelli G, Sandrini E, Altomare L, Bolelli G, Bonferroni B, Lusvarghi L, Cigada A, **De Nardo L**. *Metal injection molding as enabling technology for the production of metal prosthesis components: Electrochemical and in vitro characterization*. *Journal of Biomedical Materials Research - Part B Applied Biomaterials* **2013**;101(7):1294-1301.
- A.20 Melone L, Altomare L, Alfieri I, Lorenzi A, **De Nardo L**, Punta C. *Ceramic aerogels from TEMPO-oxidized cellulose nanofibre templates: Synthesis, characterization, and photocatalytic properties*. *Journal of Photochemistry and Photobiology A: Chemistry*, 2013;261:53-60. DOI: 10.1016/j.jphotochem.2013.04.004
- A.21 Altomare L, Visai L, Bloise N, Arciola CR, Ulivi L, Candiani G, Cigada A, Chiesa R, **De Nardo L**. *Electrochemically deposited gentamicin-loaded calcium phosphate coatings for bone tissue integration*. *International Journal of Artificial Organs* **2012**;35(10):876-883. DOI: 10.5301/ijao.5000162
- A.22 Pezzoli D, Chiesa R, **De Nardo L**, Candiani G. *We still have a long way to go to effectively deliver genes!* (2012) *Journal of Applied Biomaterials and Functional Materials*, 10 (2), pp. 82-91. ISSN: 22808000 DOI: 10.5301/JABFM.2012.9707
- A.23 **De Nardo L**, Bertoldi S, Cigada A, Tanzi MC, Haugen HJ, Farè S. *Preparation and characterization of shape memory polymer scaffolds via solvent casting/particulate leaching*. *Journal of Applied Biomaterials and Functional Materials* **2012**;10(2):119-126
- A.24 Yang J, Sangiorgio SN, Borkowski SL, Silvestro C, **De Nardo L**, Daraio C, Ebramzadeh E. *Site-specific quantification of bone quality using highly nonlinear solitary waves*. *Journal of Biomechanical Engineering* **2012**;134(10):101001
- A.25 **De Nardo L**, Raffaini G, Ebramzadeh E, Ganazzoli F. *Titanium oxide modeling and design for innovative biomedical surfaces: A concise review*. *International Journal of Artificial Organs* **2012**;35(9):629-641 ISSN: 03913988 DOI: 10.5301/ijao.5000040 PUBMED ID: 23065887
- A.26 Altomare L, Draghi L, Chiesa R, **De Nardo L**. *Morphology tuning of chitosan films via electrochemical deposition*. *Materials Letters* **2012**;78:18-21 ISSN: 0167577X DOI: 10.1016/j.matlet.2012.03.035
- A.27 Lattanzi L, Raney JR, **De Nardo L**, Misra A, Daraio C. *Nonlinear viscoelasticity of freestanding and polymer-anchored vertically aligned carbon nanotube foams*. *Journal of Applied Physics* **2012**;111(7):074314 ISSN: 00218979 DOI: 10.1063/1.3699184
- A.28 Melone L, Altomare A, Cigada A, **De Nardo L**. *Phase change material cellulosic composites for the cold storage of perishable products: From material preparation to computational evaluation*. *Applied Energy* **2012**;89(1):339-46 DOI: 10.1016/j.apenergy.2011.07.039
- A.29 Yang J, Silvestro C, Sangiorgio SN, Borkowski SL, Ebramzadeh E, **De Nardo L**, Daraio C. *Nondestructive evaluation of orthopaedic implant stability in THA using highly nonlinear solitary waves*. *Smart Materials & Structures* **2012**;21(1):012002 DOI: 10.1088/0964-1726/21/1/012002
- A.30 Misra A, Raney JR, **De Nardo L**, Craig AE, Daraio C. *Synthesis and characterization of carbon nanotube-polymer multilayer structures*. *ACS Nano* **2011**;5:7713-21 DOI: 10.1021/nn202262j
- A.31 Visai L, De Nardo L, Punta C, Melone L, Cigada A, Imbriani M, Arciola CR. *Titanium oxide antibacterial surfaces in biomedical devices*. *International Journal of Artificial Organs* **2011**;34(9):929-46 DOI: 10.5301/ijao.5000050

- A.32 Altomare L, Bellucci D, Bolelli G, Bonferroni B, Cannillo V, De Nardo L, Gadov R, Killinger A, Lusvarghi L, Sola A, Stiegler N. *Microstructure and in vitro behaviour of 45S5 bioglass coatings deposited by high velocity suspension flame spraying (HVSFS)*. Journal of Materials Science. Materials in Medicine **2011**; Doi: 10.1007/s10856-011-4307-6
- A.33 Tanzi MC, Bozzini S, Candiani G, Cigada A, **De Nardo L**, Farè S, Ganazzoli F, Gastaldi D, Levi M, Metrangolo P, Migliavacca F, Osellame R, Petrini P, Raffaini G, Resnati G, Vena P, Vesentini S, Zunino P. Trends in biomedical engineering: Focus on smart bio-materials and drug delivery. Journal of Applied Biomaterials and Biomechanics **2011**;9(2):87-97. ISSN: 17226899 DOI: 10.5301/JABB.2011.8563 PUBMED ID: 22065386
- A.34 Yang J, Silvestro C, Khatri D, **De Nardo L**, Daraio C. *Interaction of highly nonlinear solitary waves with linear elastic media*. Physical Review E **2011**;83:046606. DOI: 10.1103/PhysRevE.83.046606
- A.35 Boemio G, Rizzo P, **De Nardo L**. *Assessment of dental implant stability by means of the electromechanical impedance method*. Smart Materials & Structures **2011**;20(4) 045008 DOI: 10.1088/0964-1726/20/4/045008
- A.36 **De Nardo L**, Bertoldi S, Tanzi MC, Haugen HJ, Farè S. *Shape memory polymer cellular solid design for medical applications*. Smart Materials & Structures **2011**;20(3):035004 DOI: 10.1088/0964-1726/20/3/035004
- A.37 **De Nardo L**, Moscatelli M, Silvi F, Tanzi MC, Yahia L'H, Farè S. *Chemico-Physical Modifications Induced by Plasma and Ozone Sterilizations on Shape Memory Polyurethane Foams*. Journal of Materials Science. Materials in Medicine **2010**;21(7):2067–2078 DOI:10.1007/s10856-010-4082-9
- A.38 **De Nardo L**, Alberti R, Cigada A, Yahia L'H, Tanzi MC, Farè S. *Shape memory polymer foams for cerebral aneurysm repair: Effects of plasma sterilization on physical properties and cytocompatibility*. Acta Biomaterialia **2009**;5(5): 1508-18 DOI:10.1016/j.actbio.2008.11.017
- A.39 **De Nardo L**, Farè S, Di Matteo V, Cipolla E, Saino E, Visai L, Speziale P, Tanzi MC. *New heparinizable modified poly(carbonate urethane) surfaces diminishing bacterial colonization*. Journal of Materials Science. Materials in Medicine **2007**;18(11):2109-15 doi:10.1007/s10856-007-3083-9
- A.40 **Farè S**, De Nardo L, S. De Cicco, M. Jovenitti, M.C. Tanzi. *Different processing methods to obtain porous structure in shape memory polymers*. Materials Science Forum **2007**;539-543: 663-668
- A.41 Farè S, **De Nardo L**, De Cicco S, Jovenitti M, Tanzi MC. *Different processing methods to obtain porous structure in shape memory polymers*. Materials Science Forum **2007**; 539-543:663-668 ISSN: 0213-3725.
- A.42 Rondelli G, Brunella MF, **De Nardo L**, Cigada A. *Corrosion Behaviour of Nitinol Vascular Stents*. Advances in Science and Technology **2006**;49: 252-257 DOI: 10.4028/www.scientific.net/AST.49.252

Scientific Papers – Papers on International Books

- B.1 **De Nardo L**, Farè S. *Dynamico-mechanical characterization of polymer biomaterials*. In Characterization of Polymeric Biomaterials, edited by Tanzi MC, Farè S. Woodhead publisher **2017**;203-232. DOI:10.1016/B978-0-08-100737-2.00009-1 (ISBN: 978-0-08-100737-2 (print) 978-0-08-100743-3 (online))
- B.2 Tanzi MC, **De Nardo L**, Bertoldi S, Farè S. *Shape-memory polyurethane cellular solids for minimally invasive surgical procedures*. In Yahia l'H. editor. *Shape Memory Polymers for Biomedical Applications*. Elsevier Ltd **2015**;133-156 DOI: 10.1016/B978-0-85709-698-2.00007-6 (ISBN: 978-085709698-2 (Print) 978-085709705-7 (Online))
- B.3 **De Nardo L et al**. *From Stiffness of Iron–Carbon Diagrams to Weakness of Sensoriality: The Manifold Designerly Ways of Developing Engineering Competencies in Materials*. In Karana E, Pedgley O, Rognoli V editors. Materials Experience. Butterworth-Heinemann, Boston **2014**;315-327 DOI:10.1016/B978-0-08-099359-1.00022-9 (ISBN 9780080993591)

- B.4 **De Nardo L**, Altomare L, Del Curto B, Cigada A, Draghi L. *Electrochemical surface modifications of titanium and titanium alloys for biomedical applications*. in Driver M editor, Coatings for biomedical applications, Woodhead publisher **2012**;106-42 DOI: 10.1533/9780857093677.1.106 (ISBN 978-1-84569-568-2 (Print) 978-0-85709-367-7 (Online))
- B.5 **De Nardo L**, Raffaini G, Ganazzoli F, Chiesa R. *Metal surface oxidation and surface interactions*. In Williams R editor. *Surface modification of biomaterials - Methods, analysis and applications*. Woodhead publisher **2011**;102-42 DOI: 10.1533/9780857090768.1.102 (ISBN 978-1-84569-640-5 (print), ISBN 978-0-85709-076-8 (online))
- B.6 **De Nardo L**, Alfieri I, Lorenzi A, Saino E, Visai L, Cigada A, Montenero A. *Antibacterial Activity of Nano-Structured TiO₂ Surfaces: a Preliminary in Vitro Study*. in Acierno D, d'Amore A, Caputo D, Cioffi R editors. *Special Topics on Materials Science and Technology – The Italian Panorama*. Brill **2009**;163-171 (ISBN: 978-90-04-17224-1)
- B.7 **De Nardo L**, Farè S, Resta S, Draghi L, Tanzi MC. *Ca/P coated SMP as filler of bone defects in mini-invasive surgical procedures*. In Ravaglioli A, Krajewski A editors. *Materials for tissue engineering*. ISTE-CNR Edition **2004**:322-329 (ISBN: 88 8080 056 6)

Scientific Papers – Short Papers and Conference Proceedings

- C.1 Piselli A, Basso M, Simonato M, Furlanetto R, Del Curto B, De Nardo L. Integration of durability and sensorial properties in the material selection for professional appliances. Abstract in Journal of Applied Biomaterials and Functional Materials **2016**. DOI:10.5301/jabfm.5000321.
- C.2 Piselli A, Basso M, Simonato M, Furlanetto R, Del Curto B, De Nardo L. Materials selection tools in professional appliances: hypothesis to estimate materials' performance and impact on industrial processes. Abstract in Journal of Applied Biomaterials and Functional Materials **2015** DOI:10.5301/jabfm.5000272.
- C.3 Altomare L, Guglielmo E, Varoni EM, Rimondini L, **De Nardo L**. *Chitosan scaffolds with hierarchical porosity*. European Cells and Materials **2013**;26(6):87
- C.4 Garbagnoli P, Altomare L, Del Curto B, **De Nardo L**, Cigada A. *Development of innovative packaging characterized by active thermal insulation properties*. Technical Proceedings of the 2013 NSTI Nanotechnology Conference and Expo, NSTI-Nanotech **2013**;3:712-715
- C.5 Rizzo P, Boemio G, **De Nardo L**. *Use of the electro-mechanical impedance method for the assessment of dental implant stability*. Proceedings of SPIE - The International Society for Optical Engineering 2001;7980 DOI: 10.1117/12.879270
- C.6 **De Nardo L**, Pedretti D, Cigada A, Chiesa R. *Electrochemical Deposition of Calcium Phosphate for Implant Osseointegration and Drug Release*. 12th International Conference on Fracture, July 12-17 **2009**, Ottawa (Ca) – CD pg 1-9
- C.7 **De Nardo L**, Alfieri I, Lorenzi A, Saino E, Visai L, Speciale P, Montenero A, Cigada A. *Superfici di titanio nano strutturate con proprietà funzionali antibatteriche*. Atti del 9° Convegno Nazionale AIMAT, Piani di Sorrento, 29 Giugno - 2 Luglio **2008**: 265-8, ISBN 978-88-900948-6-6
- C.8 **De Nardo L**, De Cicco S, Jovenitti M, Tanzi MC, Farè S. *Shape memory polymer porous structures for mini-invasive for surgical procedures*. ESDA2006-95559 Proceedings of ESDA **2006** 8th Biennial ASME Conference on Engineering Systems Design and Analysis – CD 6 pp
- C.9 **De Nardo L**, Polizu S, Farè S, Draghi L, Tanzi MC, Yahia L'H. *Effects of low vacuum plasma sterilization on the chemico-physical and thermo-mechanical properties of CaloMER™, a Shape Memory Polymer*. Journal of Applied Biomaterials and Biomechanics **2004**;2:207 (ISSN 1722-6899)
- C.10 Farè S, Danielli M, Valtulina V, **De Nardo L**, Draghi L, Tanzi MC. *Cells and Bacteria Interaction of CaloMER™, Shape Memory Polymers*. Journal of Applied Biomaterials and Biomechanics **2004**;2: 210 (ISSN 1722-6899)
- C.11 **De Nardo L**, Polizu S, Farè S, Draghi L, Tanzi MC, Yahia L'H. *Sterilizzazione al plasma a basso vuoto: effetti di trattamenti idrolitici sulle proprietà superficiali di CaloMER™, Polimero a Memoria di forma*. Internal Medicine Clinical and Laboratory **2004**;2(1-3): 25-6

Scientific Abstracts – Oral and Poster Presentation at International Meetings

- E.1 Giupponi E, Tana F, De Nardo L, Pezzoli D, Candiani G, Altomare A. *Development and characterization of thiol-coated surfaces for selective cell adhesion*. 28th European Conference on Biomaterials, Athens, Greece, 4th-8th September 2017
- E.2 Tana F, Serafini A, Variola F, Bondioli F, **De Nardo L**. *Non-hydrolytic sol-gel synthesis of crystalline zirconia: a dynamic system*. XIX International Sol-gel conference, Liege **2017**
- E.3 Ayala Garcia C, Rognoli V, **De Nardo L**. *Getting Inspired by Materials - Materials Selection from a Designer's Perspective*. 9th International Materials Education Symposium, Cambridge (UK), 6-7 April **2017**
- E.4 Basso M, Piselli A, Simonato M, **De Nardo L**. *Metal Replacement with Polymers in Professional Food Processing Appliances*, COST MP1105 Training School "Strategies to study fire behaviours and fire-retardant mechanisms", Barcelona, Spain, 1-3 February **2016**
- E.5 Varoni E, Altomare L, Ghalayani Esfahani A, Cochis A, Cigada A, Rimondini L, De Nardo L. *Fine-tunable micro-pattern of porosity to promote scaffold neovascularization*. 10th World Biomaterials Congress (WBC), Montreal, 17-22 May **2016**.
- E.6 Altomare L, Pezzoli D, Tana F, **De Nardo L**, Candiani G. *Surface functionalization through sol-gel dip coating for thiol-mediated cell adhesion*. 10th World Biomaterials Congress (WBC), Montreal, 17-22 May **2016**
- E.7 Piselli A, Basso M, Simonato M, Furlanetto R, Del Curto B, **De Nardo L**. *Materials selection method for professional appliances*. 8th International Materials Education Symposium, Cambridge (UK), 7-8 April **2016**
- E.8 Altomare L, Varoni E, Rimondini L, De Nardo L. *Design of hierarchical scaffolds by cathodic polarization*. Electrophoretic Deposition V: Fundamentals and Applications October 5-10, **2014** Schloss Hernstein Hernstein, Austria
- E.9 Melli V, Sandrini E, Rondelli G, **De Nardo L**, Masoni D. Reliability of TiNbN coatings against ion release on TKA components for allergic patients. 14th EFORT Congress, Istanbul 5-8 June **2013**
- E.10 Melli C, Rondelli G, Sandrini E, Altomare L, Bolelli G, Bonferroni B, Lusvarghi L, Chiesa R, **De Nardo L**. *CoCrMo implant alloy processed via metal injection molding. Electrochemical and in vitro characterization*. Combined Meeting of Orthopaedic Research Societies - CORS 2013, Venice (Italy) October 13th - 16th **2013**
- E.11 Rondelli G, Melli V, **De Nardo L**, Chiesa R. *In vitro corrosion test of TiNbN coatings for joint replacement components*. Combined Meeting of Orthopaedic Research Societies - CORS 2013, Venice (Italy) October 13th - 16th **2013**
- E.12 Altomare L, Guglielmo E, Varoni EM, Rimondini L, **De Nardo L**. *Chitosan scaffolds with hierarchical porosity*. ISSIB Conference Rome 24-28th September **2013**
- E.13 Lattanzi L, **De Nardo L**, Daraio C. *Mechanical properties of micro-patterned carbon nanotube foams*. TechConnect WORLD, Washington, D.C., USA, May **2013**
- E.14 Melone L, Altomare L, Cigada A, Punta C, De Nardo L. *Incorporation of phase change material microcapsules in paperboard for the preparation of cold storage packaging with improved thermal properties*. MATBIM **2012** - 2nd International Meeting on Materials/Bioproduct Interaction. Dijon – France.
- E.15 Lattanzi L, **De Nardo L**, Raney JR, Daraio C. *Viscoelasticity in Vertically Aligned carbon nanotube foams as building blocks in hierarchical structures*. 42011 MRS Fall Meeting & Exhibit, Boston, USA, November **2011**
- E.16 Della Valle C, **De Nardo L**, Santin M, Meikle S, Cigada A, Chiesa R. Sol-gel TiO₂ coatings on stainless steel for orthodontic application showing antifouling properties. 24th European Conference on Biomaterials **2011**- Annual Conference of the European Society for Biomaterials
- E.17 Altomare L, Rubini F, Cigada A, Chiesa R, **De Nardo L**. *Electrochemical Deposition of Chitosan Films on Metallic Substrates*. Thermec **2011** 1-5 august Quebec City (CANADA)
- E.18 Altomare L, Rubini F, Cigada A, Chiesa R, De Nardo L. *Morphology Tuning of Chitosan Films via Electrochemical Deposition on Metallic Substrates*. SFB **2011** 13-16 April Orlando (USA)

- E.19 **De Nardo L**, Candiani G, Ulivi L, Pezzoli D, Rossi F, Perale G, Cigada A, Chiesa R. Electrochemical Deposition of Calcium-Phosphate with Antibiotics for Bone-Interface Materials. 22nd European Conference on Biomaterials, 07th -11th Sep **2009**, Lausanne
- E.20 Candiani G, **De Nardo L**, Anghileri C, Chiesa R, Cigada A. *Development of a new DNA-functionalised Titanium oxide surface*. 8th World Biomaterials Congress, 28th May – 1st Jun **2008**, Amsterdam, The Netherlands
- E.21 **De Nardo L**, Pedretti D, Cigada A, Chiesa R. *Cathodic deposition of Ca/P and selective ion substitution with antibacterial properties*. 8th World Biomaterials Congress, 28th May – 1st Jun 2008, Amsterdam, The Netherlands
- E.22 Farè S, **De Nardo L**, Brunella MF, Rondelli G, Cigada A, Jardine P, Yahia LH. Morphological Characterization and Corrosion Resistance of TiNi Foams for Biomedical Applications. Proceedings of Transaction of the 32th Annual Meeting, Society for Biomaterials, April 18th -21st **2007**, Chicago, Illinois, USA
- E.23 **De Nardo L**, Farè S, Di Matteo V, Cipolla E, Visai L, Speziale P, Tanzi MC. *New heparinizable poly(carbonate urethane) surfaces diminishing bacterial colonization*. Proceedings of the 1st Chinese-European Symposium on Biomaterials in Regenerative Medicine, April 3th-7th **2006**, Suzhou City (Jiangsu), China, 1-1 (p. 58, OR33).
- E.24 Farè S, **De Nardo L**, Cipolla E, Di Matteo V, Visai L, Tanzi MC. *Antibacterial activity of novel heparin-adsorbing poly(carbonate urethane) surface*. Proceedings of 20th European Conference on Biomaterials, Sep 27th – Oct 1st **2006**, Nantes, France, 1-1 (CD-ROM, 148).
- E.25 **De Nardo L**, De Cicco S, Jovenitti M, Tanzi MC, Farè S. *Smart scaffolds from shape memory polymer*. Proceedings of 20th European Conference on Biomaterials, Sep 27th – Oct 1st, **2006**, Nantes, France, 1-1 (CD-ROM, 217).
- E.26 **De Nardo L**, De Cicco S, Jovenitti M, Tanzi MC, Farè S. *Shape memory polymer porous structures for structures for mini-invasive surgical procedures*. Proceedings of ESDA2006, 8th Biennial ASME Conference on Engineering Systems Design and Analysis, Jul 4th -7th, **2006**, Torino, Italy, ESDA2006-95559, 1-6.
- E.27 **De Nardo L**, Locatelli E, Maccagnan S, Maccagnan G, Farè S, Tanzi MC. *Polyester-based microtubes for minimal-invasive procedures*. Proceedings 19th European Conference on Biomaterials, 11st-15th Sept, **2005**, Sorrento, Italy, 1-1 (CD-ROM, P467).
- E.28 **De Nardo L**, Polizu S, Farè S, Tanzi MC, LH Yahia. *Plasma treatment and hydrolysis behavoir of Calo MERTM, a shape memory polymer*. Proceedings of the 7th World Biomaterials Congress, 17th -21st May **2004**, Sydney, Australia, 1116 ISBN 1 877040 19 3.
- E.29 Farè S, Danielli M, **De Nardo L**, Tanzi MC. *Thermomechanical properties and cell interaction of Calo MERTM, shape memory polymer*. Proceedings of the 7th World Biomaterials Congress, 17th -21st May **2004**, Sydney, Australia, 1216 ISBN 1 877040 19 3.

Scientific Abstracts – Oral and Poster Presentation at National Meetings

- E2.1 Tana F, Serafini A, Variola F, Campiglio CE, Chiesa R, Rimondini L, De Nardo L. *Effects of ion doping on zirconia mesoporous coatings and their potential biomedical application*. XIV Congresso AIMAT 2017 Ischia Porto (Na), 12-15 luglio **2017**
- E2.2 GhalayaniEsfahani A, Soleimanzade M, Campiglio C, Altomare L, Draghi L, De Nardo L. *Composite Chitosan/Bioglass Scaffolds With Oriented Micro Patterns Made By Electrophoretic Deposition*. XIV Congresso AIMAT 2017 Ischia Porto (Na), 12-15 luglio **2017**
- E2.3 Altomare L, Pezzoli D, Tana F, De Nardo L, Candiani G. *Surface functionalization through sol-gel dip coating for thiol-mediated cell adhesion*. Congresso Nazionale SIB, Ancona, 3-5 June **2015**
- E2.4 Tana F, Messori M, Manfredini M, Cigada A, De Nardo L, Bondioli F. *Rivestimenti ibridi anti-scratch a base di ZrO₂: sintesi via sol-gel non idrolitica e caratterizzazione*. XII Convegno Nazionale AIMAT, Lecce, 21-24 September **2014**
- E2.5 Bollelli G, Bellucci D, Cannillo V, Lusvardi L, Sola A, Altomare L, **De Nardo L**, Gadow R, Killinger A, Muller P. *Development of bioactive hydroxyapatite layers by High Velocity Suspension Flame Spraying*. IX INSTM Conference, Bari 30th Jun -3rd **2013**

- E2.6 Altomare L, Melone L, Cigada A, Punta C, **De Nardo L**. *Progettazione e Modellazione di Compositi a Cambiamento di Fase (PCM)* XI Convegno Nazionale AIMAT, Gaeta (LT) 16th–19th Sep **2012**
- E2.7 Altomare L, Pezzoli D, Candiani G, **De Nardo L**, Chiesa R. *Biomolecules Grafting On Titanium Surfaces By Sol-Gel Technique*. 4° Forum Nazionale Giovani Ricercatori di Scienza e Tecnologia dei Materiali May 28th-30th **2012** Padova (PD)
- E2.8 Lattanzi L, De Nardo L, Jordan RR, Misra A, Daraio C. *Nonlinear viscoelasticity of free standing and polymer-anchored vertically-aligned carbon nanotube foams* VIII INSTM CONFERENCE, Catania, Italy, June **2011**

Patents

- P.1 **WO2013174502-A2; WO2013174502-A3; IT1412855-B**. **De Nardo L**, Candiani G, Cigada A, Zanusi MD, Zanchetta G. *Preparing anodized aluminum surfaces with antibacterial properties with formation, in situ, of e.g. nanoparticles involves chemical-physical reactions of adsorbed metal-organic compounds, and with use of aluminum oxide nanoparticles*. Application date (Italian Patent) **22/05/2012** Derwent Primary Accession Number: 2013-V88393
- P.2 **IT1421001-B**. Altomare L, Candiani G, Chiesa R, Cigada A, **De Nardo L**, Draghi L. *Process for the functionalization of non-conductive fabrics with natural or synthetic macromolecules*. Patent Assignee Name(s) and Code(s): NEXT MATERIALS SRL; MILANO POLITECNICO. Italian Patent (B) and acquired by a spin-off. Application date (Italian Patent) **06/09/2013** Derwent Primary Accession Number: 2016-13146K
- P.3 **EP2845612-A1**. **De Nardo L**, Altomare L, Cigada A, Chiesa R, Varoni E M, Rimondini L. *Manufacture of self-standing film useful in e.g. biosensor, involves carrying out electrochemical/electrophoretic deposition of macromolecules on working electrode, and removing self-standing film of variable and controlled thickness*. Italian Patent (B) and acquired by a spin-off. Application date (Italian Patent) **06/09/2013** Derwent Primary Accession Number: 2015-17930N

Milan, 7th February 2018

Signature
Luigi De Nardo