

Enrica Verné



- Born in Torino on 10th December 1966, mother of two sons (15 and 17 years old respectively).

Education:

- B.S. in Chemistry in 1992 at the University of Torino (Italy) .
- Ph.D. in Materials Engineering in 1996 at Politecnico di Torino – POLITO (Italy).

Professional experiences:

- National Scientific **Habilitation as full professor** in 2013.
- **Associate Professor** at the Applied Sciences and Technology Department (DISAT – POLITO) from **January 2012** up to today.
- **1994-2012: Assistant Professor** at POLITO.
- **1994 – 1996:** participation to the Vigoni Program of exchange of researchers between Otto Shott and POLITO, attending several periods of studies at Otto Shott Institute (Jena - Germany)

- Lecturer, since 1994, of Materials Science and Technology.
- In 1998 she developed the course of Biomaterials, activated for the first time within the Master degree of Materials Engineering at Politecnico di Torino, and successively within the Master degree of Biomedical Engineering.
- Lecturer since 1998 of several seminars on Biomaterials for the Master degree of Biotechnologies at Università di Torino.
- She is currently Professor of:
 - (i) Materials Science and Technology at POLITO, for the Bachelor degree in Biomedical Engineering.
 - (ii) Biomaterials and Nanostructured Materials at POLITO, for the Master degree in Materials Engineering,
 - (iii) Materials for Bioengineering at POLITO for the Master degree in Biomedical Engineering,
 - (iv) Advanced Therapies (Nanomedicine, Gene and Cell Therapy) in Surgery for the Bioengineering and Medical-Surgical sciences PhD program jointly established by POLITO and UNITO.

- Member of the "teaching body" of the courses of Materials Engineering and Biomedical Engineering.
- Member of the Scientific Board of the PhD program “Bioengineering and Medical-Surgical sciences”.

- Associate and project manager at BionicaTech s.r.l. (POLITO Spinoff) from January 2010 to January 2016.

Other information:

- Co-editor for *Bentham Science Publishers* for the e-book "Surface Tailoring of Inorganic Materials for Biomedical Applications".
- Member of the Editorial Board of the Journal "Biomedical glasses" DE GRUYTER OPEN.
- Member of the Editorial Advisory Board of the Journal "Recent Patents on Materials Science" *Bentham Science Publishers*.
- Member of the Scientific Board of the Journal "Challenges of Modern Technology", Ed. by *Foundation for Young Scientists*, Poland.
- Member of the Editorial Board of the Open Access Journal "The Scientific Pages of Surface Chemistry", Nevada, USA.
- 2017: Member of the Editorial Board of the Open Access Journal "Material Science & Engineering" Remedy Publications LLC, Belmont, (CA), USA.
- 2016: Guest Co-Editor for the Special Issue in the "Journal of Materials Science" (*Springer*), in memory of Prof. Larry Hench.
- 2017: Guest Editor of the "Bioactive Glasses 2017" Special Issue in the Open Access Journal "Materials" (ISSN 1996-1944; CODEN: MATEG9) journal of materials science and engineering published by *MDPI*.
- 2013: External referee of the ERC Consolidator Grant 2013 project proposals.
- 2014: referee of the SIR 2014 project proposals (MIUR)
- 2014: member of the Strategic Expert Group (SEG) of M-ERA.NET (Brussels 2014) as international expert on "Materials for Health".
- Member of the International Glass Commission (TC4 - Glasses for medicine and Biotechnologies).
- Co-chairman of the Working Group on Biomaterials (WG7) in the frame of EuMaT, the European Technology Platform for Advanced Engineering Materials and Technologies.
- Member of the Working Group (WG3) "BioMaterials" in the frame of the European Virtual Institute on Knowledge-based Multifunctional Materials AISBL (KMM-VIN).
- Member of the Management Board of Alliance for Materials Italia, leading the Working Group on Materials for Health.
- 2008 – present: Member of the European Society for Biomaterials (ESB)
- 2012 – present: Member of SIB (Italian Society for Biomaterials)
- Member of the permanent scientific committee of the annual Meeting and Seminar "Ceramic Cells and Tissues" promoted by ISTEC-CNR Faenza from 2003 to 2012.
- Member of the Scientific Advisory Board of the Materials in medicine International conference – MiMe, Faenza, Italy, 2013.
- Member of the Scientific Advisory Board of the Symposium FALL 14 R: Bioceramics for Bone and Joint Repair, in the frame of the European Materials Research Society (E-

MRS) 2014 FALL MEETING, September 15-19, Warsaw University of Technology, Poland.

- Member of the Scientific Board of the 9th International PhD Students and Young Scientists Conference “Young Scientists Towards the Challenges of Modern Technology”, 22-24 September 2014, Warsaw University of Technology, Poland.
- Symposium Organizer in three editions of the International Conferences Euromat (2007, 2009, 2011).
- Symposium Organizer ("Multifunctional Bone Scaffolds with Angiogenic and Therapeutic Potential") in the Conference TERMIS EU 2010- Galway, Ireland ~ Tissue Engineering & Regenerative Medicine Society.
- Organizer of the Special session “Biomedical Coatings” in the framework of the 10th IASTED International Conference on Biomedical Engineering ~BioMed 2013~, February 13 – 15, 2013, Innsbruck, Austria.
- Symposium Organizer (S5 - Next Generation Bioceramics and Biocomposites) in the International Conf & Expo on Advanced Ceramics and Composites - Daytona Beach, FL, January 26-31, from 2014 (38th edition) up today.
- Organizer of the International Workshop: “Materials for Health: a Value Chain in the frame of H2020” Politecnico di Torino – 16-17 July 2014.
- Topic Coordinator (Biomaterials) of the Materials Science and Engineering Conference 2018 (MSE), Darmstadt University of Technology, Germany.
- Invited speaker at 1st BioBone Workshop: "New Processing Techniques for Bioceramics" - University of Erlangen-Nuremberg, Germany, 24-25 January 2013.
- Invited speaker at the Biomaterials symposium at the DGG-ACerS GOMD 2014 meeting (Aachen, Germany, May 25 – 30, 2014).
- Keynote lecturer at the ECerS XIV Conference, Toledo, Spain, 21-25 June, 2015.

Awards:

- 2006: PoliTo award for young researchers scientific papers production.
- 2011: PoliTo awards for the scientific papers production.
- 2012: PoliTo awards for the scientific papers production.

Research activities

She is involved in the scientific research activity and co-ordinates the work of several undergraduate students, graduate fellows, PhD students and researchers, in the field of Biomaterials.

Her academic and research interests include the synthesis and characterization of bioactive glasses for bone augmentation, glass- and glass-ceramic composites, bioactive coatings on metallic or ceramic substrates, ferrimagnetic bioactive glass-ceramics for hyperthermic therapy of cancer, inorganic nanoparticles for magnetic and immunological drug targeting, antibacterial materials (such as glasses, coatings and composites for bone implants or non-implantable devices), surface functionalization of biomaterials for tissue engineering and drug delivery.

(group homepage: <http://www.composites.polito.it>)

Specifically, the following activities have been developed and funded by regional, national or international projects (with E. Verné as coordinator, unit responsible or participant):

1. Synthesis and characterization of glass- and glass-ceramic bioactive composite materials reinforced by titanium or zirconia particles. This activity was carried out in collaboration with some national and international research institutes (CNR-ISTEC - Faenza; Otto Schott Institute - Jena), and has been **funded by national and international projects (CNR 1996-1999; Vigoni Program 1994-1998)** where E. Verné was a participant.

2. Bioactive glass-ceramic and composite coatings on metallic or ceramic substrates by vacuum plasma spray or traditional glazing. These materials have been synthesized and successfully used for the realization of prototypes of osteoconductive osteosynthesis devices, in collaboration, firstly, with the Joint Research Center of Ispra (VA- Italy), subsequently with industrial partners specialized in the processing and production of biomedical devices. **This activity was funded by national programs (Biosmalti 1998-2001)** where E. Verné was a participant.

3. Synthesis and characterization of bioactive glass-ceramic scaffolds for tissue engineering and drug delivery. This research was started due to the long experience in the field of synthesis, processing and characterization of glasses, extending the collaborations to partners in the field of biological and medical science. The activity has been funded by local and national projects where E. Verné was the Principal Investigator or the local unit coordinator (**Young Researchers Project 2001; Regional Project on Applied Scientific research, 2004, Nanotechnologies and Nanoscience sector: “Materiali nanostrutturati biocompatibili per applicazioni Biomediche”; PRIN 2003 “Preparazione e caratterizzazione di materiali bioattivi a base di silice”; PRIN 2006 “Sintesi e caratterizzazione di sistemi ossidici a base di silice”**) or participant (**UE project, FP7-SME-2011 MATCH – Monoblock Acetabular cup with Trabecular-like Coating**).

4. Realization of ferrimagnetic bioactive glass-ceramics for hyperthermic therapy of cancer and their composites.

Bioactive magnetic glass-ceramic materials as potential candidates for magnetic induction hyperthermia have been developed as bulk or as powder. They are biocompatible and long-term stable in biological fluids. By a suitable functionalization process, their surface becomes biologically active and specific macromolecules (antitumoral drugs, antibodies, etc.) can be coupled for magnetic and immunological drug delivery. Composite PMMA-based bone cements have been also prepared, mixing a magnetite-containing bioactive glass-ceramic to commercial bone cements. **The research was patented and funded by Regional fundings** where E. Verné was the Principal Investigator (**Regional Project on Applied Scientific research, 2003, Health and Medical Science sector: “Biomateriali per terapie non invasive nel trattamento in ipertermia dei tumori”**).

5. Surface thermochemical treatments on titanium alloys to promote osteointegration of dental and orthopaedic implants. The study of bioactivity was extended to metallic materials due to the experience in the field of bioactive glasses and funded by European research foundations. The activity is patented (**granted international patent**) and licensed to BionicaTech for industrialization and commercialization, and funded by an Italian company leader in the dental implant production and commercialization.

6. Synthesis and characterization of bioactive antibacterial glasses.

The possibility of modifying the surface properties of glasses by means of techniques coming from photonic devices lead to optimize an innovative process for the realization of antibacterial

osteosynthesis devices. The process was **patented and funded by a research contract with an Italian Company** where E. Vernè was the Principal Investigator (Eurocoating 2006 “Realizzazione e caratterizzazione di rivestimenti vetrosi e vetroceramici biocompatibili con proprietà antibatteriche indotte dal drogaggio delle superfici con ioni argento”).

The activity was recently extended to the realization of RF co-sputtered thin films with antibacterial properties on several kind of surfaces. The research has been **patented and funded by a regional (NABLA – NANOPARTICLES ANTIBACTERIAL COATINGS) and an European Project (CE, FP7-SME-2010: NASLA – Nanostructured antiseptic coatings)** where E. Vernè was a participant.

8. Bioresorbable glasses for soft and hard tissue regeneration.

Phosphates glasses can be bioresorbed with a kinetic that can be tuned on the basis of their composition. These bioresorbable glasses can be proposed for not permanent devices that can stimulate the bone healing process and be completely replaced by bone tissue in a proper time.

9. Surface functionalization of bioactive glasses

Silica-based glasses can be easily functionalized by means of different techniques, commonly used to produce DNA gene arrays. The immobilization of biomolecules (peptides, proteins, drugs, antioxidant molecules of natural origin) by covalent bonding on the surface of bioactive glasses can offer a simple way to induce specific and localized responses from the living tissues, as guided tissue growth or controlled drug delivery. (**Funded by: Regional Project on Finalized Sanitary Research, 2006, “Funzionalizzazione superficiale di dispositivi di osteosintesi al fine di accelerarne l’integrazione”**, where E. Vernè was the Principal Investigator; **direct funding from an Italian Company**, where E. Vernè was the Principal Investigator (Gealpharma 2016, 2017)).

10. Superparamagnetic nanoparticles coated with silica, functionalized with peptides or enzymes, for drug targeting and drug delivery. These nanoparticles can be obtained by colloidal synthesis and due to their amorphous matrix, the external surface can be easily activated, by exposing the -SiOH functional groups. The presence of -SiOH group on their surface can be successfully used to graft antineoplastic molecules by direct bonding. (**Funded by AIRC project 2012 - “Development of engineered magnetic nanoparticles for cancer therapy”**; **S. Paolo Project 2010 - “Nanovettori intelligenti per la diagnosi e la terapia in Oncologia”**; **S. Paolo Project “CSP-Torino-Piemonte” 2012 - “Development of engineered magnetic nanoparticles for targeted therapies (LV-MNPs)”** where E. Vernè was the local unit coordinator and external collaborator).

11. Composite bone cements based on PMMA containing bioactive and antibacterial glasses. The activity was originally funded by regional projects (Progetto Regionale sulla Ricerca Sanitaria Finalizzata, Bando 2007, settore Igiene e Sanità Pubblica: “Cementi per artroprotesi caricati con vetri bioattivi ad azione antibatterica”) and it is now patented (**granted national patent** "Composite bone cements with a PMMA matrix, containing bioactive antibacterial glasses or glass-ceramics", pending for international extension) and licensed to BionicaTech for industrialization and commercialization, **funded by a Research contract by BionicaTech s.r.l. (2010) – “Studio di Biomateriali altamente osteointegrabili ed antibatterici”** where E. Vernè was the Principal Investigator.

12. New biomaterials for the abdominal wall repair: resorbable and not resorbable antiadhesive barriers. In collaboration with DI.PRO Med. (San Mauro Torinese - Italy), **Funded by local projects: PROTEINN 2006 and Nanomat 2007 (COREP - Politecnico di Torino)**, where E. Vernè was the Principal Investigator.

13. New materials for cardiovascular devices. Funded by the Regional project 2006 “Novel Biomaterials for Intraoperative Adjustable Devices for fine tuning of prostheses’ shape and performance in surgery “ – BIADS, where E. Vernè was the local unit coordinator.

Other funding sources not listed in the above mentioned activities:

- N.A.T.O. project (1999): “Improvements of the alumina-zirconia coatings on metallic substrates”. Collaborator.
- CONSULENZA FILK ITALIANA N.B-1390/99. Principal Investigator.
- CONS. R.O.E.N. N.179/2000. Principal Investigator.
- MURST Project 40% 2001. Principal Investigator.
- Reserach Project INSTM (Consorzio Interuniversitario Nazionale per la Scienza e Tecnologia dei Materiali) 2004. Principal Investigator.
- CONSUL. SINAPSI N.458/2006
- Concorso oneri ricerca n. 573/07 DI.PRO s.a.s. Principal Investigator.
- MIUR project, Art. 12 D.M. 593/00 and D.D. n° 1983 6 december 2007: Financial support for educational activities from Sorin BIOMEDICA CARDIO S.r.l. Principal Investigator.
- Network of Excellence ‘Knowledge-based multicomponent materials for durable and safe performance’ (KMM-NoE) (2005-2008). Collaborator.
- MSE Bando Industria 2015 INDESIT . Collaborator.
- European Contract FP7-PEOPLE-2010-ITN - GlaCERCo – GLASS AND CERAMIC COMPOSITES FOR HIGH TECHNOLOGY APPLICATIONS . Collaborator.
- Research contract DiPro Med (2010) – Nanostructured Functional and active textiles for nanowell. Principal Investigator.
- Project JOLIE ERANET MATERA – International cooperation. Collaborator.
- Project STEPS - FASE II - Piattaforme Aerospazio. Collaborator.
- Regional Project n. 539/2014 MARTe, Polo di Innovazione. Collaborator.

Publications:

Enrica Verné has **over 150 peer-reviewed journal publications and nine patents and patent pending applications** in the above mentioned areas and **over one hundred publications on conference proceedings.**

SCOPUS index:

- **156 indexed publications**
- **2623 total citations**
- **H Index 30**

The list of her publications is reported at the PoliTo web site:

(<http://porto.polito.it/view/creators/Verne=27=3AEnrica=3A002126=3A.type.html>).

The three most cited publications on SCOPUS and Web of Science are:

- C. Vitale Brovarone; Verne' E.; L. Robiglio; P. Appendino; F. Bassi; G. Martinasso; G. Muzio; R.A. Canuto (2007) *Development of glass-ceramic scaffolds for bone tissue engineering: characterisation, proliferation of human osteoblasts and nodule formation.* In: ACTA BIOMATERIALIA, vol. 3, pp. 199-208. - ISSN 1742-7061
Web of Science: 127 - Scopus: 147
- Verne' E.; Di Nunzio S.; Bosetti M.; Appendino P.; Vitale Brovarone C.; Maina G.; Cannas M.

(2005) *Surface characterization of silver-doped bioactive glass*. In: **BIOMATERIALS**, vol. 26, pp. 5111-5119. - ISSN 0142-9612

Web of Science: 89 - Scopus: 92

- M. Ferraris; Verne' E.; P. Appendino; C. Moisescu; A. Krajewski; A. Ravaglioli; A. Piancastelli (2000) *Coatings on zirconia for medical applications*. In: **BIOMATERIALS**, vol. 21, pp. 765-773. - ISSN 0142-9612

Web of Science: 81 - Scopus: 87

Recent collaborations:

National

- Istituto Zooprofilattico - Torino
- Dip. Scienze Mediche e Anatomia Umana, Univ. Piemonte Orientale – Novara
- Dip. Di Medicina Sperimentale e Oncologia, Università di Torino.
- Dip. Traumatologia, Ortopedia e Medicina del Lavoro – CTO - Torino
- A.O. San Luigi Gonzaga – Torino
- Dipartimento di Chimica, Università di Torino
- Politecnico di Milano
- CNR-ISTEC-Faenza
- Sorin Biomedica, Saluggia, VC.
- DI.PRO Medical, Torino.
- NobilBio Ricerche, Asti.
- Istituto Nazionale per la ricerca sul cancro (Genova),
- Università di Messina,
- Ospedale San Raffaele Milano
- IRCCS Candiolo

International

- Università di Erlangen-Nuremberg - Germania
- Trinity College – Dublino - Irlanda
- J. Stefan Institute, Ljubljana, Slovenia
- Brigham and Women's Hospital (Boston, Massachusetts, U.S.A.)
- Tampere University of Technology, Tampere, Finland.
- BioMediTech, Tampere, Finland.
- Network of Excellence 'Knowledge-based multicomponent materials for durable and safe performance' (KMM-NoE).