

Enrica Verné

Graduate in Chemistry at the University of Torino, PhD on Materials Engineering on November 1996, Assistant Professor at Politecnico di Torino, starting from October 1st 1994, at the Materials Science and Chemical Engineering Department (DISMIC), confirmed in November 1997. Associate Professor at the Applied Sciences and Technology Department (DISAT - ex DISMIC) since January 2012. She obtained the National Scientific Habilitation as Full professor in 2013 and in 2019. Full Professor of Materials Science and Technology at the Applied Sciences and Technology Department (DISAT) from December 2019. Member of the "teaching body" of the courses of Materials Engineering and Biomedical Engineering. Member of the Scientific Board of the PhD program "Biomedical Engineering" and from 2014 of the PhD program "Bioengineering and Medical-Surgical sciences at Politecnico di Torino.

Lecturer, since 1994, of Materials Science and Technology, and, since 1998, of Biomaterials, for Materials Engineering, Biomedical Engineering and Biotechnologies at Politecnico di Torino and Università di Torino. 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 Management Board of Alliance for Materials Italia, leading the Working Group on Materials for Health.

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.

Co-editor for Bentham of the e-book "Surface Tailoring of Inorganic Materials for Biomedical Applications".

Member of the POLITO Spinoff "BionicaTech s.r.l." from 2010 to 2016.

From 1994 to 1996 she attended several periods of studies at Otto Schott Institute (Jena - Germany) during the Vigoni Program of exchange of researchers between Otto Schott and POLITO.

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 following fields.

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).
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), more recently with industrial partners specialized in the processing and production of biomedical devices. Also this activity was funded by national programs (Biosmalti 1998-2001)
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 (Progetto Giovani Ricercatori 2001; PRIN 2003; PRIN 2006, PRIN 2022) and international ones (ed internazionali (UE - HE - Excellent Science – MSCA -REBONE - End-to-end multidisciplinary optimal design for improved personalized bioactive glass/ceramic bone substitute implants, (2024-2027))

4. Realization of ferrimagnetic bioactive glass-ceramics for hyperthermic therapy of cancer. International patent and Regional fundings.

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, with a signed contract with 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 a collaboration with biomedical industries and hospitals is started. 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) and an European project (NASLA).

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 (4-12 months).

Works are in progress to investigate the use of these glasses as scaffolds for hard and soft tissues replacement and to study their solubility in vitro e in vivo.

8. 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) 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. Experimental work is ongoing with which different surface treatments applicable to glasses, glass ceramics, scaffolds for bone reconstruction and metals are developed (PREMUROSA - MSCA-ITN-2019, (2020-2023) - Scientific Responsible, EU Research - H2020 - Excellent Science - Marie Curie). The use of plasma treatments has recently been introduced (POTENTE - Plasma-treated biocompatible glasses and ceramics with osteointegrative and antibacterial properties, (2023-2025) - Research group member, PNRR - Mission 4)..

9. ferrimagnetic nanoparticles coated with silica, functionalized with peptides or enzymes, for drug targeting and drug delivery (Funded by AIRC project - "Development of engineered magnetic nanoparticles for cancer therapy"; S. Paolo Project - "Nanovettori intelligenti per la diagnosi e la terapia in Oncologia"; S. Paolo Project "CSP-Torino-Piemonte" - "Development of engineered magnetic nanoparticles for targeted therapies (LV-MNPs)").

10. Composite bone cements based on PMMA containing bioactive and antibacterial glasses. The activity was originally funded by regional projects 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.

11. New biomaterials for the abdominal wall repair: resorbable and not resorbable antiadhesive barriers. In collaboration with DI.PRO Med. (San Mauro Torinese), Funded by Progetto PROTEINN 2007. Progetto Nanomat 2007.

12. Composite bone cement with bioactive properties for spine surgery.

(vertebroplasty and kyphoplasty). The activity is patent pending and licensed to BionicaTech for industrialization and commercialization.

Enrica Verné has over 260 peer-reviewed journal publications and nine patents in the above mentioned areas (H index 51 - Scopus, July 2024).

Awards:

- 2006: PoliTo award for young researchers scientific papers production.

- 2011 and 2012: PoliTo awards for the scientific papers production of PoliTo.

- 2007: Award from "Federation of European Materials Societies" for the service as "Symposium Organizer" for the organization of the Symposium "Bioactive Materials, Surfaces and Coatings" in the frame of the "International Conference Euromat 2007" (10-13 Sept 2007, Nuremberg, Germany).

- 2017: Award from the American Ceramic Society for the activity of Reviewer.

- 2024: Award for the best scientific article, winner of the 2024 edition of the Ross Coffin Purdy Award assigned by ACERS.