

Curriculum Vitae of Giuseppe Pezzotti

Vice President, Full Professor (tenure),

Dr. Eng., Dr. Med. (Orthopaedic), Dr. Med. (Immunology), Dr. Sci. (Physics)
Giuseppe Pezzotti

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Language proficiency: Italian (mother tongue), Japanese (spoken and read, nearly native; written, typing input preferred); English (spoken, read and written nearly native)

Education:

1979-1984: Bachelor in Mechanical Engineering (*summa cum laude*), Rome University "La Sapienza" Rome, Italy.

1991: Doctoral Degree (Dr. Eng.) in Materials Engineering from Osaka University, Osaka, Japan.

2012: Doctoral Degree in Medical Science, Orthopedics (Dr. Med.) from Tokyo Medical University, Tokyo, Japan.

2014: Doctoral Degree in Science, Solid State Physics (Dr. Sci.) from Kyoto University, Kyoto, Japan.

2020: Doctoral Degree in Medical Science, Immunology (Dr. Med.) from Kyoto Prefectural University of Medicine, Kyoto, Japan.

Academic curriculum and government appointments:

1991-1993: Post-doctoral fellow, Institute of Scientific and Industrial Research, Osaka University, Osaka, Japan.

1993-1994: Guest Researcher, Institute for Metals, Tohoku University, Sendai, Japan.

1994-1996: Assistant Professor, Department of Materials Science, Toyohashi Institute of Technology, Toyohashi, Japan.

1996-2000: Associate Professor, Department of Materials Engineering, Kyoto Institute of Technology, Kyoto, Japan.

2000-present: Full Professor (tenure position), Department of Materials Engineering, Kyoto Institute of Technology, Kyoto, Japan.

2002-2007: Director, Research Institute for Nanoscience, Kyoto Institute of Technology, Kyoto, Japan.

2005-2015: Adjunct Professor, Loma Linda University, Department of Orthodontics and Research, Loma Linda, CA, USA.

2006-2012: Member of Scientific Committee of the Italian National Research Council, CNR, nominated by the Italian Minister of Education, University and Scientific Research.

2008-present: Invited Professor, The Center for Advanced Medical Engineering and Informatics, Osaka University, Osaka, Japan.

2010-2017: Visiting Professor, Department of Molecular Cell Physiology, Graduate School of Medical Science, Kyoto Prefectural University of Medicine, Kyoto, Japan.

2012-2013: Member of Review Activity Committee, The Italian Agency for the Evaluation of University and Research, ANVUR, nominated by the Italian Minister of Education, University and Scientific Research. 2016-present: Visiting Professor, Department of Orthopedic Surgery, Tokyo Medical University, Tokyo, Japan.

2017-present: Adjunct Professor, Department of Immunology, Kyoto Prefectural University of Medicine, Kyoto, Japan.

2017-2021: Vice President and Director of the International Center, Kyoto Institute of Technology, Kyoto, Japan. 2020-present: Lecturer, Institute of Biomaterials and Bioengineering, Tokyo Medical and Dental University (TMDU), Tokyo, Japan.

2020-present: Honorary Fellow, Ca' Foscari University of Venice, Venice, Italy,

2021-present: External Board Member, Ca' Foscari University of Venice, Venice, Italy.

2021-present: Vice President for Collaborative Research in Health Science, Kyoto Institute of Technology, Kyoto, Japan.

Short-term invited professorships:

May 1994: Invited Lecturer, Department of Applied Chemistry, Rome University, Rome, Italy, Short Course (16 hours) for Graduate Students: "Applied Stereology and Image Analysis".

May 1995: Invited Lecturer, Department of Applied Chemistry, Rome University, Rome, Italy, Short Course (16 hours) for Graduate Students: "Analytical Microscopy and Spectroscopy Techniques in Materials Science".

August 1996: Guest Professor, Institute for Materials, University of Bayreuth, Bayreuth, Germany, Short Course (12 hours) for Graduate Students: "Deformation Mechanics of Polycrystalline Ceramics",

December 1996: Invited Professor, Department of Applied Chemistry and Materials Engineering, University of Trieste, Trieste, Italy, Short Course (10 hours) for Graduate Students: "Fracture Mechanics of Ceramics".

August 1997: Guest Professor, Institute for Materials, University of Bayreuth, Germany, Short Course (12 hours) for Graduate Students: "Mechanical Properties of Ceramic Composites".

September 1997: Guest Professor, Department of Physical Metallurgy, Technical University of Hamburg-Harburg, Hamburg, Germany, Short Course (12 hours) for Graduate Students: "High-Temperature Deformation of Monolithic Ceramics".

December 1997: Invited Professor, Department of Applied Chemistry and Materials Engineering, University of Trieste, Trieste, Italy, Short Course (10 hours) for Graduate Students: "Deformation Mechanics of Ceramics".

August 1998: Guest Professor, Institute for Materials, University of Bayreuth, Bayreuth, Germany, Short Course (12 hours) for Doctoral Students: "Fracture Mechanics of Polycrystalline Ceramics".

August 1998: Guest Professor, Department of Advanced Ceramics, Technical University of Hamburg-Harburg, Hamburg, Germany, Short Course (12 hours) for Graduate Students: "Computational and Experimental Fracture Mechanics of Ceramics".

September 1998: Invited Professor, Department of Physics and Engineering, Ryukoku University, Seta, Japan, Short Course (15 hours) for Graduate Students: "Science and Engineering of Ceramic Materials".

June 2000: Invited Professor, Shanghai Institute of Ceramics, Shanghai, China, Short Course (6 hours) for Graduate Students: "Micro/nanomechanics of Ceramics".

December 2000: Invited Professor, Department of Materials Science, University of New South Wales, Australia, graduate student research supervisor.

August 2004: Invited Professor, Department of Physics and Engineering, Ryukoku University, Seta, Japan, Short Course (15 hours) for Graduate Students: "Micro and Nanomechanics of Ceramic Materials".

June 2007: Guest Professor, Berlin Technical University, Berlin, Germany. February-

March 2008: Guest Professor, University of New South Wales, Sydney, Australia.

April 2012: Invited Professor, Shanghai Institute of Ceramics, Shanghai, China, Short Course for Graduate Students: Raman spectroscopic analyses of piezoelectrics.

December 2013-January 2014: Guest Professor, Venice Ca' Foscari University, Venice, Italy.

December 2015: Guest Professor, Padova University, Padova, Italy.

December 2015-2019: Guest Professor, Venice Ca' Foscari University, Venice, Italy.

December 2018: Guest Professor, Padova University, Padova, Italy.

December 2019: Invited Professor, Padova University, Padova, Italy.

Research Activity

Author/coauthor of 716 refereed papers (H-index 49, Citations 11369), 10 book chapters, 1 book as the sole author, and 10 patents (including the world patent on nanoscale stress microscopy and related measurements). Author of about 50 invited lectures in the last 5 years. The present research activity deals with several branches of Mechanics, Physics, Materials Science, Food Science, and Medicine (orthopedics, dentistry, immunology, virology, and cell physiology). Basic research focuses on Solid State Physics, Physics of Deformation/Fracture, and Spectroscopy of Solids and Biomaterials, with particular emphasis on Raman,

Fluorescence, and Cathodoluminescence Spectroscopy. Applied research spans over a large variety of applications.

Activity on Biomaterials and Biomechanics is focused on: (i) clarifying the wear degradation mechanisms operative in the ceramic and in the polymeric parts of artificial joints by means of advanced spectroscopic techniques (e.g., Raman and luminescence microprobe spectroscopy); (ii) elucidating the relationships between internal stress distributions and functionality of bones, teeth and synthetic hydroxyapatites; (iii) improving the reliability and the lifetime of artificial joints through the development of new non-destructive, non-contact evaluation techniques; (iv) developing new diagnostic methods based on fiber-Raman spectroscopy for artificial joints and human teeth/gingivae to be applied *in vivo*; (v) developing Raman spectroscopic analyses of the metabolism of living cells, bacteria, and viruses.

The research activity on Semiconductors is focused on: (i) developing new spectroscopic tools for the detection of residual stresses on the micro/nanoscale in both oxide and non-oxide semiconductor devices; (ii) improving reliability and lifetime of electronic devices through a non-destructive, non-contact spectroscopic evaluation; (iii) improving processing techniques for electronic devices by clarifying the relationships among thermal treatments, residual stress fields and functional properties; (iv) quantifying the materials response by the exact determination of the interaction volume between the focused beam and the material, with the possibility of identification of property gradients within the probe.

The research on Piezoelectric and Dielectric devices is centered on (i) non-destructive quantitative analyses of crystallographic orientation and its relationship with electric and mechanical properties of the material, by means of Polarized Raman Spectroscopy; (ii) understanding the interconnections between domain switching and residual stress in commercial multilayer capacitors, sensors and actuators; (iii) developing a non-destructive testing procedure for the online evaluation of micro/nanoscale residual stresses in commercial devices, therefore contributing to improve both the production process and the product itself.

The research in the field of Food Science is focused on the Raman analyses of food quality and other molecular-scale characteristics by Raman spectroscopy. Special emphasis is placed on studying the Japanese Food Heritage Washoku, including a large variety of Japanese rice, Japanese sake, and Japanese fruits. Raman algorithms have been developed for non-destructive and non-contact analyses of amylose/amylopectin ratio, proteins and antioxidants, as well as the fractions of different types of mono- and polysaccharides.

Additional research topics deal with the development of mathematical methods and software for the establishment of mathematical aids for Raman and Cathodoluminescence Spectroscopies, as the determination of the Probe Response Functions and the deconvolution of highly graded stress fields.

Consulting appointments:

2002-2005: scientific advisor for Sumitomo Metal Technology, Co. Ltd.
2002-2005: scientific advisor for Matsushita Technoresearch, Inc.
2002-2005: scientific advisor for Kyocera. Bioceram (presently, JMM, Inc.).
2002-2005: scientific advisor for NGK-NTK Technical Ceramics, Co.
2002-2005: scientific advisor for Horiba, Co. Ltd.
2002-2005: scientific advisor for Murata Manufacturing, Co.
2002-2005: scientific advisor for Taiyo-Yuden, Co. Ltd.
2003-2005: scientific advisor for Sanyo, Co. Ltd.
2003-2005: scientific advisor for Matsushita Electric Works, Co. Ltd.
2003-2005: scientific advisor for Mitsubishi Materials, Co. Ltd.
2015-2020: scientific advisor for Amedica Co. (present SINTX)
2016-2017: scientific advisor for Tribogenics Co.
2019-present: academic consulting for Shofu Inc.
2021-present: scientific advisor for Otsuka Electronics Co., Ltd.
2021-present: scientific advisor for Denka Co., Ltd.

Past and present Academic Society Memberships

Member of The American Ceramic Society
Member of The Ceramic Society of Japan
Member of The Australasian Ceramic Society
Member of The International Society for Bioceramics
Member of International Society for Technology in Arthroplasty
Member of The Japanese Hip Society
Honorable Member of The Academia of Sciences of Bologna Institute Fellow of Physiological Society of Japan Board of Trustee of Physiological Society of Japan
Member of Japanese Stomatological Society
Member of Japanese Society of Oral and Maxillofacial Surgeons

Editorial and other appointments:

1997-1999: Associate Editor of the Journal of the Ceramic Society of Japan.
2001-present: Associate Editor of the Journal of the Australasian Ceramic Society.
2003-present: Member of the Selection Committee for Intergovernmental Scholarships between Italy and Japan.
2004-present: Member of the International Advisory Board of the 11th World Ceramics Congress, CIMTEC.
2011: Guest Editor of the special issue: "Advances in Electronic Materials and Devices in the Far East" in *physica status solidi (a)*.
2013: Guest Editor of the special issue: "Advances in Artificial Joint Biomaterials" in

Journal of the Mechanical Behavior of Biomaterials.

2020: Guest Editor of the Special Issue: "Antipathogenic Effects and Their Molecular Imaging in Dental and Orthopedic Research" in the journal *Antibiotics*.

Major research grants and awards:

1995: Recipient of the Mitsubishi Foundation Research Grant (10 ml. Jp Yen) for the research on New Ceramic Alloys.

1996: Recipient of the Award for the outstanding papers published in the Journal of the Ceramic Society of Japan.

1998: Recipient of the Toray Foundation Research Grant (10 ml. Jp Yen) for the research on Microfracture Mechanisms in Ceramics Studied by Fluorescence and Raman Microprobe Spectroscopy.

1998: Recipient of Tanigawa Foundation Research Grant (2 ml. Jp Yen) for the research on Ultrahigh Temperature Internal Friction of Ceramics.

2000: Recipient of the NEDO Grant for Quantum-structure and Micromechanics (82 ml. Jp Yen) from the Japanese Government.

2003: Recipient of the Japanese MEXT Grant (10 ml. Jp Yen) for Nanomechanics of glass and ceramic materials.

2003: Recipient of the NEDO Grant for Development of a Nanostress Microscope in collaboration with Horiba Co., Ltd. (36 ml. Jp Yen) from the Japanese Government.

2003: Recipient of an Intergovernmental Research Fund (12 ml. Jp Yen) from the Italian Ministry of Foreign Affairs for Advanced Nanotechnologies.

2004: Recipient of the Japanese MEXT Grant (4 ml. Jp Yen) for Nanomechanics of glass and ceramic materials.

2004: Recipient of an Intergovernmental Research Fund (12 ml. Jp Yen) from the Italian Ministry of Foreign Affairs for Advanced Nanotechnologies.

2004: Recipient of the Award for the Best Poster Presentation at the International Conference on Advanced Ceramic Materials, EnCera 2004, Osaka, Japan.

2004: Recipient of the Award for the Best Poster Presentation at the International Conference on New Frontiers of Process Science and Engineering in Advanced Materials, PSEA'04, 2004, Kyoto, Japan.

2005: Recipient of the Official Gratitude Award from the Chinese Embassy in Tokyo.

2006: Recipient of a Research Fund (24 ml. Jp Yen) from the Italian Government for the opening of a Research Center of the Italian National Council of Research in Kyoto.

2009: Recipient of the Official Gratitude Award from the Chinese Embassy in Tokyo.

2010: Recipient of the Murata Foundation Research Grant (0.4 ml. Jp Yen) for the Workshop "6th SIC-RCDAMP-KIT Joint Workshop on Advanced Inorganic Materials".

2011: Recipient of Murata Foundation Research Grant (1.5 ml. Jp Yen) for the research on Raman spectroscopy of piezoelectrics.

2011: Recipient of the Prize "150 years of Italian science in the world" in occasion of the 150th Anniversary of the Italian Republic. 2011: Recipient of an Official Gratitude Award from the Research Society for Orthopaedic Biomaterials.

2011: Recipient of the International Postdoctoral Fellowship Grant (0.8 ml. Jp Yen) from Japan Society for Promotion of Science,

2012: Recipient of the International Postdoctoral Fellowship Grant (0.8 ml. Jp Yen) from Japan Society for Promotion of Science.

2012: Recipient of the Best Researcher Award from the President of Kyoto Institute of Technology.

2012: Recipient of the Top Cited Papers for 2011 and 2012 from the Chemical Engineering Journal.

2013: Recipient of the Health Science in Kyoto research grant (0.4 ml. Jp Yen).

2014: Recipient of the International Postdoctoral Fellowship Grant (0.8 ml. Jp Yen) from Japan Society for Promotion of Science.

2014-2015: Recipient of the International Model Research Group Grant (1.5ml. Jp Yen) from Super Global University Program.

2015: Recipient of the Award of Promotion of internationalization for Kyoto City from Kyoto city.

2016: Recipient of the award of Promotion of local activation for Kyoto city from Kyoto city

2017: Recipient of the Prize for Science and Technology, Research Category, The Commendation for Science and Technology by the Minister of Education, Culture, Science, and Technology.

2017-2019: Recipient of Grant-in-Aid Scientific Research C, (4.6 ml. Yen) from The Ministry of Education, Culture, Sports, Science and Technology (MEXT).

2018: Recipient of the Health Science in Kyoto research grant (0.4 ml. Jp Yen).

2019: Recipient of the 4 Kyoto University collaboration program grant (3.5 ml. Jp Yen)

2019: Recipient of the Julian Schwinger Foundation research Award and Grant (80,000 USD).

2020-2022: Recipient of Grant-in-Aid Scientific Research C, (4.2 ml. Yen) from The Ministry of Education, Culture, Sports, Science and Technology (MEXT).

2020: Recipient of the Health Science in Kyoto research grant (0.3 ml. Jp Yen).

2020-2022: Recipient of the International Postdoctoral Fellowship Grant (2.3 ml. Jp Yen) from Japan Society for Promotion of Science. 2020; Recipient of the project for the development technology for counteracting virus pandemics (52 ml. Jp Yen) form Japan Agency for Medical Research and Development.

2021: Decorated with the title of Cavaliere (Knight) of the Order of the Star of Italy

Conference and event organization:

November 24-25th, 2003: Organization of the workshop "Recent achievements in nanoscience, I: an industrial perspective in Kyoto, Japan.

November 15-16h, 2004: Organization of the workshop "Recent achievements in nanoscience, II: an industrial perspective", in Kyoto, Japan.

May 18th, 2007: Organization of the workshop "Kyoto Reception: The future of Italian-Japanese scientific and industrial collaboration" in the mainframe of the "Italian Spring in Japan", Kyoto, Japan.

October 17, 2007: Organization of the "3rd SIC-RCDAMP-KIT Joint Workshop on Advanced Inorganic Materials", Kyoto, Japan.

October 21-22nd, 2010: Organization of the "6th SIC-RCDAMP-KIT Joint Workshop on Advanced Inorganic Materials", Kyoto, Japan.

October 24th, 2011: Organization of the symposium "Effect of radiations on human health" following the Nuclear Accident of Fukushima, Tokyo, Japan.

November 22nd, 2011: Organization of the seminar "Kyoto Reception: scientific and industrial collaboration between Italy and Japan", Kyoto, Japan (in cooperation with the Italian Embassy in Tokyo).

April 7, 2012: Organization of the forum "1st Forum on Advanced Bioma Artificial Joints", Kyoto, Japan.

July 19th, 2013: Organization of "2nd Forum on Advanced Biomaterials for Artificial points", Kyoto, Japan.

April 23rd, 2014: Organization of the event: "Italy meets Asia: Scientific venue in Kyoto 2014", Kyoto, Japan.

November 10, 2014: Organization of the "3rd Forum on Advanced Biomaterials for Artificial Joints", Kyoto, Japan.

April 1st, 2015: Organization of the event: "Italy meets Asia: Scientific Venue in Kyoto 2015", Kyoto, Japan (in cooperation with the Italian Embassy in Tokyo).

November 18, 2017: Organization of the event, "Italy meets Asia: Scientific Venue in Kyoto 2017" Kyoto, Japan (in cooperation with the Italian Embassy in Tokyo).

October 22nd, 2018: Organization of the symposium "Australia-Japan Innovation & Research Symposium in Kyoto" Kyoto, Japan (in cooperation with the Australian Embassy in Tokyo).