Foreword

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Honorary Chairman of the JAPMED'12

As Honorary Chairman of the Executive Committee it is my great pleasure to present in this Proceedings Journal the selected peer reviewed Papers of the 12th Japanese-Mediterranean Workshop on Applied Electromagnetic Engineering for Magnetic, Superconducting, Multifunctional and Nano Materials (JAPMED'12) a landmark in development of materials, advanced manufacturing and mechanical and electromagnetic engineering, organized at Batumi Shota Rustaveli State University, Batumi, Georgia on July 17-20, 2023.

This Conference, held every two years, has been jointly organized this year by my international Project Center for Nanotechnology and Advanced Engineering, the Japan Society of Applied Electromagnetics and Mechanics, the two high level American Universities Texas A&M and University of Nevada Reno, the Faculty of Electrical Engineering and Electronics of the National Technical University of Athens, the Izmir Institute of Technology, Turkey, the Beijing Institute of Technology, P.R. of China and the two leading Georgian Universities, the Batumi Shota Rustaveli State University and the Georgian Technical University.

The JAPMED has been originated in the late 90's from the previous, very successful, 1st and 2nd Japanese - Greek Joint Workshops, held in Athens, Greece in May 1999 and Oita, Japan in May 2001, respectively. Subsequently, it was extended to further wide International participation and cooperation, with the 3rd Event hosted in Athens, Greece in May 2003, the 4th in Cairo, Egypt in September 2005, the 5th in Larnaca, Cyprus in September 2007, the 6th in Bucharest, Romania in July 2009, the 7th in Budapest, Hungary in July 2011, the 8th in Athens, Greece in June 2013, the 9th in Sofia, Bulgaria in July 2015, the 10th in Izmir, Turkey in July 2017, the 11th in Batumi, Georgia in July 2019, whilst the current 12th Conference, initially planned for July 2021, has been postponed until today due to the Pandemic COVID-19.

This Conference provides a forum for specialists from Universities, Research Centers and Industry of various Countries worldwide to establish cooperation, to share knowledge and experience and the cross-fertilization of new ideas and developments in the design, analysis, new materials utilization and optimization techniques in the broad areas of electromagnetics and advanced manufacturing of advanced materials and their industrial sustainable applications, in the modern technological sectors: precision / ultraprecision engineering, nanotechnology, powder production and processing associated with high strain-rate

phenomena, electricity and electronics, biomedical engineering, transportation, safety and defense, energy and environment. Additional topics related to practical applications, operation, maintenance and sustainability are also highly encouraged, see the attached final Conference Program.

From the very beginning, the high- and low-temperature superconductivity constituted the first preferential subject of the Conference, focusing on the recent progress in physics, mechanics, materials and applications of high- and low- temperature superconductors, with a projection to the emerging and future areas in science and technology.

Magnetic materials, such as magneto-resistance and ferroelectric materials, as well as conventional ferromagnetic materials and electromagnetics, constitute the second preferential subject, with results that appear to exhibit a breakthrough either conceptually or in the applications they generate.

The scope of the Conference has been further expanded over the years towards advanced manufacturing to include the modern advanced technological fields: nanotechnology, precision / ultraprecision manufacturing, biomedical engineering and transport, whilst, ten years ago, two additional topics have been included, namely: the multifunctional materials, in relation also to computational mechanics, i.e. the interests of the then International Institute for Multifunctional Materials for Energy Conversion (IIMEC) of the Texas A&M University, and the shock loading of materials and structures, as a part of the that time established Shockwaves Cluster, involving cooperation between Greece, Russia, USA, Germany, Japan, China, Hungary, Ukraine, Turkey, Georgia and India. The purpose of this international cooperation is the strong belief that we have to enhance our efforts and cooperation towards these advanced technologies, which may greatly affect our lives in the future.

Since sustainability prevails in science, technology, industry and many other parts of human life, as a follow-up of my Sustainability Award for the SIPS 2018 Mamalis International Symposium on Advanced Manufacturing of Advanced Materials and Structures with Sustainable Industrial Applications in November 2018 in Rio de Janeiro, it has been incorporated in the JAPMED topics, with the aim to further enhancing our international collaboration.

Although the world financial crisis, the war in Ukraine and the Pandemic COVID-19 have highly affected the much higher expected participation in this Conference, my Georgian Colleagues and I have done our best to demonstrate the famous Georgian and Balkan hospitality, not sparing any effort to make your stay in this beautiful Country memorable. I am sure that your participation in this Conference is going to be an exciting experience with many benefits to all of us.

Finally, the last but not the least, as Founder of the JAPMED Conferences I have taken the initiative to dedicate this JAPMED'12 to my beloved, too clever and beautiful three years old Granddaughter LYDIA, being sure that she will suceed in her future scientific life.