

SPECIAL ISSUE ON NEW FUNCTIONS OF MICRO/NANO MATERIALS AND DEVICES

PREFACE



It is my great pleasure to introduce the Special Issue on New Functions of Micro/Nano Materials and Devices in Sensors and Materials. This special issue focuses on new functions provided by micro/nano/atomic-scale materials, structures, and spacings as well as microdevices with new functions derived from those attractive characteristics. With the rapid progress of top-down and bottom-up technologies, nowadays, various types of micro/nano-sized materials and structures can be precisely produced. It is reported that such small materials give rise to new emergent functions that have never before been seen. For example, in nanomechanics, it has been discovered that if single-crystal silicon, which is well known as a brittle material in bulk, is shrunk to the nanometer scale, it shows plastic deformation originating from dislocation glide even at intermediate temperatures. This is used for plastic reshaping in silicon devices. As another example, it has been discovered that in a gap between two electrodes with nanometer-size sharpened tips, a tunneling current flows without physical contact between the two. It is a fundamental principle of the scanning tunnelling microscope. Both are already old topics, but such discoveries interest not only researchers but also engineers who are developing new functional devices and will become a trigger to create a new R&D field.

Ten powerful and wonderful research papers are included in this special issue. They are from a variety of research fields, such as photovoltaic devices, nanomechanical devices, functional and mechanical materials, and thermal and mechanical analyses, and are not limited to experimental studies but include simulation studies. I am confident that readers will read these papers with great interest while envisioning new innovations for their future research dreams.

I would like to thank all the authors for submitting their outstanding papers to this special issue, and I also thank the participating reviewers. Lastly, I would like to extend my sincere gratitude to all the staff members, especially Ms. Tomoko Tanabe, of MYU K.K. Without their commitment, this special issue would not have come to fruition.

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