IMR KINKEN Research Highlights 2018

Research

Preface

Dear Colleagues,

We are pleased to present *KINKEN* Research Highlights 2018, which is the annual report that includes a collection of research outputs of the past year from the Institute for Materials Research (IMR), Tohoku University. *KINKEN* is the abbreviation for "Kinzoku Zairyo Kenkyujo," the Japanese name for IMR, which is well known in the materials science community.

IMR celebrated its centenary in 2016. Professor Kotaro Honda established the IMR at the Tohoku Imperial University in 1916 as the 2nd Division of the Provisional Institute of Physical and Chemical Research. At that time the primary research focus was steel. Thereafter, the research domains gradually broadened to include various types of alloys and metals. The name was changed into the Research Institute for Iron, Steel and Other Metals (RIISOM) in 1922. Subsequently, the institute developed into a global center for fundamental and applied research covering all types of materials, including nonmetals. In 1987 the institute was reorganized into a national collaborative research institute affiliated with Tohoku University, and consequently renamed to the present Institute for Materials Research (IMR).

IMR has greatly contributed to the advancement of materials science and engineering. The invention of KS steel in 1916, the strongest permanent magnet at that time, was the first great achievement. In subsequent years, many different types of practically useable materials have successfully been developed, including new KS steel, Sendust alloy, SiC fibers, various intermetallic compounds, and more recently, amorphous alloys. In addition, considerable effort was dedicated to basic research for materials development, which paved the way for pioneering research in magnetism, superconductivity,

Director Prof. Koki Takanashi

optical properties, and microstructure analyses of materials. Recently, IMR has created a wide array of new materials, including high-performance, high-quality, and multifunctional materials such as bulk metallic glasses, nanostructured materials, nanocomposites, ceramics, crystals, oxides, nitrides, hydrides, complexes, organic materials, etc., which are useful for electronic, optical, magnetic, spintronic, biological, energetic, and infrastructural applications.

In the 21st Century, we face worldwide environmental problems such as global warming and the depletion of resources and energy. There is an increasing need to preserve the environment and work towards achieving sustainable societies. IMR upholds these themes with the objective of “contributing to the well being of the human race and the development of civilization through the creation of new materials that are truly useful to society”.

We hope that the KINKEN Research Highlights will enable you to better understand our recent research activities and will aid the promotion of worldwide collaboration with IMR. We ask for your continued support and welcome any suggestions.