



Preface

Dear colleagues,

Around one and half years have passed since the Great East Japan Earthquake happened on 11 March 2011. The Institute for Materials Research, Tohoku University (KINKEN) has already recovered and the people at KINKEN are working under ordinary conditions. We would like to express our sincere thanks to you for helping us to come back to ordinary working conditions after the horrible disaster.

We are pleased to bring out *KINKEN Research Highlights 2012*, which is the sixth annual report with a collection of research output during the past year from the Institute for Materials Research (IMR), Tohoku University. KINKEN (short Japanese name of IMR, which is familiar to the materials community, particularly in Japan) determined in 2007 to launch this report annually so that our colleagues around the world can recognize our research activities. In this report, the research activities of individual research laboratories and research centers, as well as joint projects with other academic institutions, are provided, especially for the following three key research fields: (1) Infrastructural Materials, (2) Energy-related Materials, and (3) Electronic Materials.

The Institute was established at Tohoku Imperial University in 1916 by Professor Kotaro Honda as a steel research organization known officially as the 2nd Division of the Provisional Institute of Physical and Chemical Research. In 1987, the Institute was reorganized into its present form as a national collaborative research institute attached to Tohoku University. The name of the institute was consequently changed to the Institute for Materials Research (IMR). Since its establishment, IMR has become known for its excellence in both basic and applied research on metals and a wide range of new materials. A variety of functional materials have been studied and developed at the Institute, including the KS magnet steel, new KS magnet steel, SiC fiber, compound alloys, metallic glasses, and others.



Director



IMR has greatly contributed to the advancement of materials science. As one example, our study of magnetism resulted in the invention of the strongest permanent magnet, the KS magnet, which dramatically improves the performance of electrical machines. IMR has been paying great attention to basic research that opens up the most advanced areas of applications. More recently, IMR has created a wide array of new materials, including high-performance, high-quality, and multifunctional materials such as amorphous alloys; bulk metallic glasses; intermetallic compounds; quasicrystals; oxides; ceramics; nanostructured metals; Si; Ge; III-V, II-VI, and oxide semiconductors; optical and electronic materials; solar cell crystals; biomaterials; organic materials; hydrogen storage alloys; and shaped crystals.

Now, we are facing the serious issues of the deteriorating global environment and the depletion of worldwide natural resources and energy sources. IMR will further promote materials research to address the problems associated with the global environment and energy resources, aiming at sustaining human development and ensuring a high standard of living for all people. In this way, we will offer a brighter future for the next generation.

We earnestly hope that *KINKEN Research Highlights* will help you recognize and support our research activities and will serve as a medium to promote worldwide collaborations in materials research with our institute. We sincerely ask for your continuing support and welcome any suggestions.

Sincerely yours