



Preface



Director

Dear colleagues,

We would like to convey our deepest sympathies to everyone especially those who have still hard time to recover from the disaster caused by the earthquake, tsunami, and all problems related to the radiation leak in Fukushima happened on 11th March 2011.

Fortunately, damage of building and staffs at Institute for Materials Research (IMR), Tohoku University was not so serious, but a lot of our machines were damaged by the earthquake. Right now, we are pleased to announce that a lot of our machines damaged by the earthquake have been fixed and we have kept putting our best effort to make rapid progress for early recovery. I am proud that all staffs at IMR worked very hard to recover from the damages by the earthquake as a team and never forgot the words from Professor Kotaro Honda as KINKEN spirit, “The time where we live now is the most important,” and “Do not give up.” As a result, we would like to announce that IMR is truly recovered and fine. All staffs at IMR are strongly motivated to go forward to accomplish our tasks.

We experienced and survived from this unprecedented tragedy, which most of the organizations have never experienced. As a result, based on what we have learned from this disaster, we believe that we can bring our society new great subjects of our research themes which might help to build safer and stronger society for our future in the world. In addition, we keep doing our best to go forward and also bring our best to our society.

We are pleased to bring out *KINKEN Research Highlights 2011*, which is the fifth-annual report with a collection of research output during the past year from Institute for Materials Research (IMR), Tohoku University. KINKEN (short Japanese name of IMR, which is familiar to materials community, particularly in Japan) determined to launch this report annually since 2007 so that our colleagues around the world can recognize our research activities. In this report, research activities of individual research laboratories, research centers, as well as joint projects with other academic institutions are provided especially for 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



Emergency office (march 11 ~ march 31, 2011)



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.

IMR has greatly contributed to the advancement of the materials science. As one example, our study of magnetism results 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 issue 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 serve as the medium to promote world-wide collaborations in materials research with our institute. We sincerely ask for your continuing support and welcome any suggestions.

Sincerely yours