



Remarks on Special Issue on New Materials

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The popularization of mobile electronic devices represented by smartphones connecting people and virtual reality entertainment is evident today. In this context, Singularity, the predicted moment when artificial intelligence (AI) will surpass human intelligence, is said to be imminent. Various materials are used to make parts; and the parts are used to assemble valuable tools that support people's lives.

In particular, in the 5th Science and Technology Basic Plan adopted in January 2016, the Japanese government's aim is to achieve the ideal super-smart "Society 5.0," and announced that it would start initiatives for various fundamental technology development. In the vision of Society 5.0, IoT (Internet of Things), big data, AI, and robot technologies will be sophisticatedly combined to integrate cyberspace with physical space. Achieving such a super-smart society naturally requires the foundation of technologies based on materials and electronic circuits including enabling processes, namely, fundamental material technologies where Japan is highly competitive.

The Advanced Technology Research Laboratories (ATRL) of Nippon Steel & Sumitomo Metal Corporation have worked on research and development diligently over a long period of time, producing a wide variety of materials and processes beneficial to people's lives, and utilizing the outcomes for making useful new products widely used through our group companies.

In addition to the core business, steel manufacturing, the ATRL, as a corporate lab of the entire group across the areas of chemicals, new materials, engineering, etc., has launched various new materials. At the same time, the ATRL has the functions of making fundamental technologies as well, taking roles to provide technologies to utilize those new materials. The achievements from such efforts include the development of a new high-performance copper bonding wire for LSI circuits, which won the National Commendation for Invention prize, the Commendation for Science and Technology prize by the Minister of Education, Culture, Sports, Science and Technology, and the Ichimura Prize in Industry for Outstanding Achievement. As exemplified by this, the ATRL have created remarkable results. In this special issue, we would like to present a part of the research and development in which the ATRL is engaged for the support and creation of new material businesses in our group.

To what extent a material or technology has fulfilled the requirements of customers or society determines its value. We have been dedicating our efforts to meet the demand from the market in the new material development. Researchers at our labs, devoting themselves to daily tasks through trial and error, appreciate difficult requirements from customers that have led us to achievements and enabled us to fulfill those requirements.

We will continuously strive to research and develop diverse materials and processes, as pilots of our group, supporting the group companies and looking ahead to see changes in the future.

We hope that the readers will understand our work in the development of new materials. Furthermore, we would appreciate the readers' assistance in helping us to identify new challenges.