Growing interest in shape memory alloys (SMA) and new technologies developed from them extend a scope and an intensity of scientific research. In recent years some alloys are found to exhibit unusual for early known “smart” materials properties related to ferromagnetic state and opening up a possibility of shape memory effect (SME) controlled by magnetic field. It admitted to distinguish such alloys for a separate class of ferromagnetic SMAs. These materials may have many applications primarily as actuators activated by magnetic field. For subsequent progress in this direction an integration of various research group efforts is required. So a demand arises for closer cooperation and discussion of results obtained. A step forward in this direction was made by the Third International Symposium on Shape Memory Alloys and Related Technology – “SMART-2000”, held on 18–20 August 2000 in Sendai, Japan, organized by the Institute of Fluid Science, Tohoku University.

We tried to involve possible number of countries to stimulate an international participation. As a result 88 persons arrived from nine countries that was about three times as much as that was an year earlier at SMART-1999. Nine participants spoke at the Symposium as invited speakers. We also had 30 contributed presentations. The subjects being discussed were broken down to following themes.

Among main topics were the following:

1. Magnetically controlled shape memory alloys.
2. Electromagnetically functional shape memory alloy actuators.
3. Martensitic transformations and shape memory effect in thin films.
4. Medical application of shape memory alloys.
5. Intelligent structures using shape memory alloys.

Issues associated with ferromagnetic SMA Ni-Mn-Ga mainly related to basic science dominated at the SMART-2000 Symposium. In this case special attention was focused on possibility of SME controlled by magnetic field. In this connection researchers came up to the point of elaboration of technologies using high potential of Ni-Mn-Ga alloys. First of all scientists studying this alloy seek to gain results making possible to join advantages of piezoelectric and magnetostrictive materials, namely, short reaction time along with large displacements.

During SMART-2000 as well as previous SMART-1999 results of the investigation of Ni-Mn-Ga properties especially within a temperature interval of phase transformations figured prominently in participant reports. Among them some part is related to the investigation of magnetic and magnetoelastic properties. The findings of inelastic neutron, X-ray diffraction and TEM studies of Ni-Mn-Ga crystal structure providing information on the mechanism of the martensitic and premartensitic transformations and allowing plotting a phase diagram for high temperatures were also presented. One work was associated with a sample fabrication, namely, with problems of preparation of uniform composition samples.

Works on other SMAs were presented, particularly dedicated to properties of Ni-Ti and Fe-Pd thin films and harnessing them as microactuators. On further progress in searching new materials relating to ferromagnetic SMAs one report was dedicated to Fe₃Pt single crystal. Issues of SMA applications
were considered in separate session. This session included overview report on recent development of SMA microactuators followed by SMA applications in medical engineering. New types of SMAs that extend field of electromagnetically functional SMAs, namely, shape memory superconductors, Fe-based composite functional SMA, shape memory glasses were presented at SMART-2000.

Among presented papers in SMART-2000 fourteen papers appeared in this special issue as selected papers. Reflecting the number of papers presented at the symposium, half of the papers in this issue are dedicated to Ni-Mn-Ga alloy research. We are convinced that high level all presentations and papers testified serious progresses in the investigations of fundamental properties of SMAs as well as in engineering developments and are a good basis for future research works.

It should be pointed out that fruitful works at the Symposium in many respects was promoted by high scientific motivation of participants and quality of their papers. We are grateful to the Ministry of Education, Culture, Sports, Science and Technology, the Japan Society of Applied Electromagnetis and Mechanics, Japan Society of Mechanical Engineers, Japan Institute of Metals for their support in organization of SMART-2000. We would like to thank Inoue Foundation for Science, the Kajima Foundation, and the Asahi Glass Foundation for sponsoring our meeting, and members of International Organizing Committee for high activities at a preparation of SMART-2000. Thanks are also to all staff of Advanced Systems Evaluation Laboratory for well-coordinated work at guest reception and symposium organization.

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