Development of high strength magnesium alloys becomes very important in weight reduction in various kinds of vehicles. Recently, a series of Mg- transition metal (TM) - rare earth (RE) alloy, which were developed in Japan, have been attracting wide attention in the world. These alloys contain a peculiar structure called “Synchronized Long-Period Stacking Ordered (LPSO) Structure”, which features synchronization of chemical and structural modulations and show superior mechanical properties including high strength owing to unique atomic arrangement of LPSO structure.

It has been 4 years since the “Synchronized Long-Period Stacking Ordered Structure” collaborative research project started in 2011 with the financial support of Grant-in-Aid for Scientific Research on Innovative Areas from the Ministry of Education, Culture, Sports, Science and Technology (MEXT). Great efforts have been devoted to clarify the fundamentals of this alloy, such as detailed atomic arrangement and formation mechanisms of LPSO structure, its deformation mechanisms and resulting mechanical properties. As a part of its activity, the 2nd International Symposium on Long-Period Stacking Ordered Structure and Its Related Materials (LPSO2014) was held last year in Kumamoto. In this symposium, various experimental, theoretical, and computational studies were reported for the following topics:

1) Crystallography and atomic arrangement of synchronized LPSO structure
2) Formation mechanisms and conditions of LPSO structure
3) Deformation and strengthening mechanisms of LPSO structure
4) High strength magnesium alloys containing LPSO structure and their applications

This special issue entitled “Long-Period Stacking Ordered Structure and Its Related Materials II” was planned to collect main achievements in the recent, more up-to-date research on LPSO structure and its related materials. Many of the results contained in this issue were presented in LPSO2014. We, the editors, appreciate great contributions by all the authors and hope that this special issue is useful for fundamental understanding of the LPSO structure and attracts further interest from many researchers in the world.

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