Editorial

Nanoscience and nanotechnology have a history of nearly a decade-long intensive development. Since National Nanotechnology initiation of USA (in the year 2000), many important progresses have been made in this multidisciplinary field around the world. The Chinese scientists have also made many important contributions to the promotion of nanoscience in this period, especially in the nanomaterial field. To introduce the major achievements by Chinese scientists in the nanomaterial field, “*Science in China Series G: Physics, Mechanics & Astronomy*” editorial board has invited a number of the major players in the research of nanomaterials in China to contribute to this special issue. We also hope that the publication of this issue could further promote the research on nanomaterials in China. The papers in this issue are authored mostly by the scientists who have taken active parts in the national key basic research “Nanoscience Plan” and/or in the project “Nanomaterials and Nanostructures” supported by the State Key Development Program for Basic Research of China. However, this issue only represents a fraction of the progresses in this active field due to the page limit.

The papers in this issue focus on the following topics.

(1) The nanofabrication and its relation between properties and structures: As a new type of advanced material, nanomaterial has its own property because of its unique structure. Therefore, its researches are carried out extensively in China. On one hand, the investigation of nanomaterials can make the scientists gain a deeper insight into the intrinsic relation between the property and structure. On the other hand, this investigation expands the scope of solid state physics and material science. For example, nanometals, nanooxides, nanosemiconductors, nanomagnets and nanophoto-electronic materials as well as nanocomposites consist of a new category of material science and provide a new stage of solid state physics.

To demonstrate the major progresses of nanomaterial research, we have selected a few papers on the controlled fabrication, relation between the microstructure and property, chemical and structural stability here. These basic researches will be the basis of engineering nanomaterials, and the most important task for developing nanoscience and is listed in the national program “Nanoscience Plan”. Basically, this issue contains the remarkable progress on the composition, addition and aggregation of nanomaterials in the bulk materials that improve the performance of the common materials. The progresses are described in more papers of this issue on optical, electrical, magnetic, storage and display nanomaterials, engineering plastics and light alloys as well as nanocomposites with the unique property.

(2) Self-assembly process: The interaction among the nano “build blocks”, various super molecules and nanostructures, simulation of bioprocess in the assembly process are introduced in this issue. Also the various products with the designed structure and/or property are described here. Besides these hot topics, also introduced here are the structure and defects on the interface inside nanomaterials, the external surface state of nanomaterials, and the responsibility to the environment.

(3) Nanofabrication and characterization: As the characteristic length of the nanoscale patterns or devices system reached step by step the limitation of the fabrication, for example less than 10 nm, the physical and

chemical problems at the nanoscale emerge and dominate the quality of the products. Here the related few researches are reported for promoting the activities in this aspect. The atomic manipulation and the interaction between individual molecule and substrate are the essential problems, which can provide an insight into the information on the chemical reaction at the single molecule level. Therefore, we select a few papers to introduce the related progress in China. However, the studies in this aspect are a long-term task, and more reports will be published in the other issue. As for characterization at the nano-scale, the aim of research is to realize 1 nm resolution in space and the individual molecule sensitivity. However, the research in this field has been carried out only for a short time; the related report does not appear in this issue.

(4) Nanomaterials related nanodevices: At the moment, the nanodevices only contain the electronic, photoelectronic and sensor at the nano scale. In this field, the modification of the existent materials has been carried out extensively to promote the devices scaling down to nano-size in China. Besides, exploration of the new nanomaterials for the next generation devices is undergoing in China and will become more and more intensive in the near future. To realize the multifunctional, more highly integrated and smart devices, nanomaterials will have a more important role, and hence only a few research results are reported in the issue.

In summary, nanoscience is one of the fastest developing subjects now. We believe that the important progresses will be made. Therefore, we hope that the Chinese scientists inside and outside China submit more of their own research results to this journal. The special issue will be a common platform to promote research in nanoscience in China. Finally, we would like to thank “*Science in China Series G: Physics, Mechanics & Astronomy*” for the publication of this issue.

(XIE Sishen, Institute of Physics, Chinese Academy of Sciences)