FOREWORD

Nanoarchitectonics for Manipulation of Atom, Molecule, and Materials

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Nanoarchitectonics for Manipulation of Atom, Molecule, and Materials

The time for a major paradigm shift from nanotechnology to nanoarchitectonics has come. So far, scientists in nanoscience and nanotechnology have been creating fine nanomaterials and nanosystems using advanced physical techniques and apparatus, mainly as separate processes. These involve the fabrication of small objects and the observation of their behaviors. However, we now have to construct fine systems from these nanocomponents similar to the way that carpenters architect house and buildings. Technological efforts at the nanoscale have to be organized and converted into the new concept of nanoarchitectonics.

Architecting components into fine materials and systems can be carried out through several key processes such as self-organization, physical/chemical nanomanipulation, field-induced control of the ordering/orientation, and their integration. However, this cannot be accomplished so easily, because unexpected disturbances including thermal and statistical fluctuations always have unavoidable effects at the nanoscale. Therefore, architecting functional systems with nanoscale components cannot be architected one by one by a stepwise and simple combination of preexisting technologies. Instead, the harmonization of various effects is crucial for the creation of target systems. In particular, the manipulation of atoms, molecules, and nanomaterials will be key processes. This Selected Topics in Applied Physics (STAP) contains papers on recent typical approaches to nanoarchitectonics for the manipulation of atoms, molecules, and materials.

It is high time for a paradigm shift from nanotechnology to nanoarchitectonics. Such a paradigm shift will open the door to the use of nanoarchitectonics in applied physics.

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