



## Special Feature: Nanostructured Materials

### Overview

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Nanostructured materials are a new class of materials, one of the most promising from the standpoint of technological innovations in a wide range of industries. This special issue focuses on our recent research results concerning three kinds of nanostructured materials: (i) silicon nanosheets, (ii) carbon nanotubes, and (iii) nanoporous materials. Silicon nanosheets, which were discovered at our laboratory in 2006, were the first two-dimensional silicon structures composed of a single-crystalline monolayer. The synthesis, optical, and electrical properties and potential applications of silicon nanosheets are reviewed in the first article. Carbon nanotubes have already been extensively studied owing to their extraordinary thermal conductivity, and mechanical and electrical properties. The second article reports the synthesis of vertically aligned carbon nanotubes, and their thermal and electrical conduction properties. Ordered mesoporous materials have also attracted much attention because of their potential applications, not only as catalysts and adsorbents, but also as optical and electrical devices. Highly fluorescent and color-tunable transparent films (the third article) and photocatalysts for CO<sub>2</sub> reduction and H<sub>2</sub> evolution from water (the fourth article) were fabricated using periodic mesoporous organosilicas, which were synthesized for the first time at our laboratory in 1999. The fifth article presents core/shell monodispersed mesoporous silica spheres (MMSSs) with gold nanoparticles in the core part and hydrophobic organic groups in the shell part, which have potential applications in unique catalytic and plasmonic materials.