

Editorial: Nanostructured Materials

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Nanotechnology can be defined as the development, fabrication, and utilization of materials, devices, and systems through the control of the structure on the nanometer scale, that is, at the level of atoms, molecules, crystals, and supramolecular structures. The challenge for researchers working in the field of nanotechnology is the ability to work at these levels to generate larger structures with fundamentally new atomic, molecular, or particle organization. These nanostructures, assembled from building blocks understood from first principles, exhibit novel physical, chemical, mechanical, and biological properties and phenomena. Control of materials on the nanoscale already plays an important role in scientific disciplines as diverse as physics, chemistry, materials science, biology, medicine, engineering, and computer simulation. For example, it has been shown that carbon nanotubes have a 60 times higher specific strength than steel, and that nanoparticles can target and kill cancer cells. All natural materials and systems establish their foundation at the nanoscale; control of matter at molecular levels means tailoring properties, phenomena, and processes exactly at the scale where the basic properties are determined. Nanotechnology, and especially nanostructured materials as well as materials for nanotechnology will be a strategic branch of science and engineering for the next century. This was the reason why the COST action "Nanostructured Materials" was created in 1998. This action, one of the largest in the field of material science, is focused on fundamental as well as application related aspects of the development of nanostructured materials including modelling and simulation of the properties of such materials. All aspects of materials, mechanical, magnetic, optical, chemical, and electric properties, and the synthesis and characterization of such structures are included in this large research program in which 24 European countries are participating.

This special issue of *Chemical Monthly* gives an overview of the above-mentioned activities of the COST action on the occasion of the mid term meeting of the action in Limerick, October 3–4, 2001. It contains a selection of talks given there which reflect the broad and interesting research area of nanostructured materials as well as the high standard of the participating research groups. The editors hope that this collection stimulates the interest of the materials science community to reinforce research activities in the field of application of such novel materials. This means that, beside the fundamental research regarding the properties of nanosized building blocks, new and economically interesting

fabrication methods of bulk material as well as of nanostructured materials and nanosized structures which are synthesised directly on devices or chips have to be developed.

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