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# Preface

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This special issue of Journal of Materials Science on Ultrafine-Grained (UFG) Materials contains a selection of papers presented at the Fifth International Symposium on Ultrafine-Grained Materials (UFG V) held in New Orleans, United States, on March 9–13, 2008. These papers were reviewed according to the strict reviewing policies of the journal and only those meeting the quality required for regular papers were accepted for publication. The papers cover recent progress in a range of scientific and engineering issues in the field of UFG materials as well as their processing via severe plastic deformation (SPD), including fundamentals, processing and microstructure evolution, mechanical and physical properties, superplasticity, computational and analytical modeling, and new SPD technologies.

UFG materials include both *submicrocrystalline* materials with grain sizes in the range of 100 to 1,000 nm and *nanocrystalline* materials with grain sizes below 100 nm. SPD is an approach in which coarse-grained metals and alloys are plastically deformed by extremely large strains to form UFG structures. More details on the definitions of UFG materials and SPD can be found in an overview article (JOM, April 2006, p. 33). Prominent among SPD techniques are equal-channel angular pressing, high-pressure torsion, and accumulative roll bonding. Further SPD techniques developed in recent years can be found in http://www.nanoSPD.org, the website established by the International nanoSPD Steering Committee. Bulk UFG/nanostructured materials produced by SPD techniques are 100% dense and contamination-free and therefore they have much better mechanical properties, especially ductility, than those produced by other techniques such as nano-powder consolidation.

In the last few years, the field of SPD processing of UFG/nanostructured materials has made significant

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progress. Specifically, several promising SPD techniques have been developed that have a potential for producing UFG/nanostructured materials at an industrial scale and at low cost. There are also significant developments in understanding the deformation mechanisms of nanostructured metals and alloys with grain sizes smaller than 100 nm. In addition, researchers in this community are addressing critical areas such as enhancing the ductility and fatigue strength of nanostructured materials, obtaining some very encouraging results that may ultimately enable their widespread application.

Worldwide research and development efforts in this field have been increasing every year, as seen by the ongoing increase in number of scientific publications and the increasing frequency of international conferences. More information on past and future conferences can be found at http://www.nanoSPD.org.