

New Developments in the Processing and Properties of Ultrafine-grained Metals

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Abstract

Conventional thermo-mechanical processing provides the potential for producing materials with very small grain sizes, typically of the order of 5-10 μm . However, experiments have demonstrated that much smaller grain sizes may be attained, in the submicrometer or nanometer range, through the application of severe plastic deformation. Typical processing techniques include equal-channel angular pressing (ECAP) and high-pressure torsion (HPT). Materials processed using these procedures have several advantages over coarse-grained materials including exceptionally high strength and a potential for use in rapid superplastic forming operations at elevated temperatures. Accordingly, this has become a major research area within the field of Materials Science over the last decade. New developments in this field are described in this report.

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