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# Consolidation of Advanced Powders by Severe Plastic Deformation

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Advances in the production of nanostructured powders over the past decade have given materials scientists new opportunities for the creation of high strength bulk materials. Mechanical alloying, gas atomization, electro-explosion and other novel synthesis methods coupled with better alloy composition selections have enabled the production of a wide variety of metastable extremely fine structured powders. Bulk material with extraordinary properties should result if such powders can be consolidated without significant changes to the microstructure, and strong interparticle bonding is achieved. In the work reported here, one approach for consolidation by severe plastic deformation (equal channel angular extrusion – ECAE) of amorphous and/or nanostructured materials is discussed. The effects of particle size, initial material microstructure, and extrusion conditions are considered; consolidate evaluation is made by metallographic examination, mechanical testing and other means. Examples of recent work on amorphous Vitreloy 106a and pure Cu will be presented. The results show that ECAE possesses interesting benefits and significant challenges for the effective consolidation of particulate into materials with high structural efficiency, and may a viable method for fabrication of bulk nanostructured materials.

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