Abstract Submitted
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Shock Consolidation and High Strain Rate Deformation/Die Upsetting of Magnetic Powders[1] CHRISTOPHER WEHRENBERG, NARESH THADHANI, Georgia Institute of Technology, MATTHEW WILLARD, MARIA DANIIL, Multifunctional Materials Branch, Navy Research Lab, S.G. SANKAR, Advanced Materials Corporation, DARPA-DSO TEAM — Materials comprised of a high magnetization soft phase exchange coupled with a high coercivity hard phase have the potential to substantially increase the highest available energy product for permanent magnet applications. Producing bulk magnets requires overcoming challenges in both consolidation with retention of nano-scale structure, and development of texture with the low rare-earth content. High strain rate severe plastic deformation provides the potential advantages in overcoming these difficulties. In the present work, melt-spun magnetic powders of NdFeB and PrFeB/alpha-Fe are used for shock compaction and novel high rate deformation experiments. Recovered samples are characterized for density, microstructure, magnetic properties, and texture. The powder packing (green) density and shock pressure are identified as important factors in achieving high density compacts, and retention of nano-scale grain size with only limited coarsening of the grains is observed.

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