

Preparation of microstructured and nanostructured magnetic materials by mechanical deformation

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Abstract: A novel hydrostatic extrusion process utilising sacrificial Al billets has been developed to allow the size reduction by deformation of samples of various cross-sectional shape (e.g. square, rectangular). Cyclic deformation of a stack of sub-mm thick foils of magnetic and non-magnetic metals (Fe and Ag), combining extrusion with cold-rolling, has been used to prepare nanoscaled multilayered structures. 6% GMR was measured in the Fe/Ag multilayer system, after 4 deformation cycles, in the current-in-plane geometry at 4K. Extrusion was also used to prepare micro-composite Sm/Fe structures which were subsequently heat treated to form magnetostrictive SmFe_2 rods with room temperature magnetostriction values as large as -800ppm in the extrusion direction. © 2002 Elsevier Science B.V. All rights reserved.

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