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Processing of τ- MnAl

τ- MnAl has an estimated maximum energy product, $(BH)_{max}$, of 12 MGOe, which is twice that of AlNiCo magnets and is composed of much cheaper elements. On a density-compensated basis $(BH)_{max}$ for τ- MnAl is almost two-thirds the value for SmCo magnets. In this presentation, we will outline various processing routes that we have used to produce powders of MnAl including gas atomization, rapid solidification processing using the Pratt and Whitney RSR process, and casting followed by pulverization. The resulting particulates were mechanically milled to produce nanocrystalline material using a Union Process attritor. The high temperature ε-phase was present both before and after milling along with significant amounts of equilibrium Υ_2 and β phases. In addition, ribbons were produced by melt spinning, which had a similar mix of ε, β and Υ_2 phases. We will outline the effects of annealing on the phases present and the magnetic properties of the various powders and ribbons. We will also present the results of the use of back-pressure assisted equal channel angular extrusion through which the powders are simultaneously consolidated and transformed to the τ phase.

Biography

Ian Baker obtained his BA and D. Phil in Metallurgy and Science of Materials from the University of Oxford. He is the Sherman Fairchild Professor of Engineering and Senior Associate Dean at the Thayer School of Engineering, Dartmouth College. He has published 400 papers and given over 300 presentations at universities, conferences and in industry, of which 150 were invited. He is a fellow of ASM, TMS, IOM3, MRS and AAAS. He is the editor in Chief of *Materials Characterization*.

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