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Hard magnetic phase evolution in nanocrystalline mechanically milled amorphous $Pr_2Co_{14}B$ powder[1] CAJETAN NLEBEDIM, Ames Laboratory, U.S. Department of Energy, HUSEYIN UCAR, PARANS PARANTHAMAN, Oak Ridge National Laboratory, U.S. Department of Energy, R.W. MCCALLUM, Ames Laboratory, U.S. Department of Energy — In this work, the evolution of the structural and magnetic properties of $Pr_2Co_{14}B$ with mechanical milling and heat-treatment is presented. Understanding the phase evolution of magnetic properties in hard magnetic materials is crucial for developing high performance permanent magnets. Mechanical alloying/milling offers a traditional and easily deployable approach to synthesizing nanostructured materials. Nevertheless, such can result in amorphization due to high defect density leading to disorder in atomic arrangement. The crystalline phase can be thermally recovered but requires the understanding of how the properties evolve with temperature, in order to achieve useful hard magnetic properties desired for developing permanent magnets. This work shows how properties such as energy product, coercivity, remanent magnetization, saturation magnetization and Curie temperature evolve when PrCoB alloy transitions from amorphous to crystalline phase. The presentation will also include how different levels of amorphization affect the magnetic properties.

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