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Pr2Fe14B/ α-Fe nanocomposite powders produced by mechanical alloying and subsequent annealing

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This article reports a study of nanocristalline composite magnets obtained using mechanical alloying and subsequent annealing treatment as an alternative route of production for preparing nanomagnetic powders of Pr-Fe-B alloys. Combination between hard (Pr2Fe14B) and soft (α-Fe) phases causes an exchange coupling interaction when the size of grains are of the order of twice the domain wall width of hard phase (about 10nm). Remanence enhancement is associated with this interaction. In this work PrxFex-94B6 (x = 8, 10 and 12) compositions have been used. The magnetic powders were characterized by means of a vibrating sample magnetometer (VSM), compositions were identified by X-Ray diffraction (XRD) and microstructures investigated using transmission electron microscopy (TEM).