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INFLUENCE OF Nb ADDITION AND COOLING RATE ON PROPERTIES OF PrFeB ALLOYS PRODUCED BY MELT SPINNING

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Resumo:

Abstract PrFeB permanent magnets are relevant materials in technological applications, like electric motors, power generators, transducers and wave guides. In order to optimize their properties some alloy elements, as Nb, are being investigated to improve their microstructures and magnetic properties by grain size controlling. Furthermore, the rapid cooling by melt spinning can also improve their microstructures, depending of process parameters. For understand the role of Nb additions to the starting alloy on the microstructure and magnetic properties of sintered magnets a study was made varying the Nb content from 0.1% to 0.5% (at.). The influence of melt spinning parameters was made varying the velocity and leakage pressure. The cell parameters, presence of free Fe, crystallite sizes and microstrains were investigated by X-ray diffraction employing the Rietveld Method for the refinement of data. However, it's necessary to understand why Nb improves the magnetic properties, were studied different alloys, which Nb varies from 0 to 0.5% and were made by melt spinning. Being that, the alloy with 0,1 of Nb showed better intrinsic coercivity of 157 kA m⁻¹ and crystallite size of 54 nm using the Scherrer method, it was also noticed that there's no free iron in this alloy. [1] Brown, D. N., Wu, Z., H Brown, D. N., Wu, Z., He, F., Miller, D. J., & Herchenroeder, J. W. (2014). Dysprosium-free melt-spun permanent magnets. *Journal of Physics: Condensed Matter*, 26(6), 64202 e, F., Miller, D. J., & Herchenroeder, J. W. Dysprosium-free melt-spun permanent magnets. *Journal of Physics: Condensed Matter*, 26(6), 64202 (2014). [2] Ahmed, F. M.; Edgley, D. S.; Harris, I. R. Effect of niobium addition on the NdFeB alloy magnet. *J. Alloys Compd.* v. 209, (1994). [3] Allibert C. H., Effect of Nb and Zr on the phases present in Nd-Fe-B alloys for permanent magnets. *J. Less-Common Metals*, v. 152, L1-L4, (1989).