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Magnetic properties of a novel Pr - Fe - Ti phase

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In a systematic study of the $(Pr_{1-x}Ti_x)Fe_5$ alloy series, the $(Pr_{0.65}Ti_{0.35})Fe_5$ alloy has been found to have a dominant phase with either the rhombohedral Th_2Zn_{17} structure or the newly discovered $Nd_2(Fe,Ti)_{19}$ (S. J. Collocott, R. K. Day, J. B. Dunlop, and R. L. Davis, in Proceedings of the Seventh International Symposium on Magnetic Anisotropy and Coercivity in *R* - *T* Alloys, Canberra, July 1992, p. 437) structure, depending on the annealing procedure. Powder - x - ray - diffraction patterns and scanning electron microscopy show that the sample annealed at a temperature of 850 °C followed by 1000 °C has the 2:17 structure whereas annealing at 1000 °C directly leads to the new 2:19 structure. Energy - dispersive x - ray analysis yields Pr:Fe:Ti ratios of 10.7:86.2:3.1 for the $Pr_2(Fe,Ti)_{17}$ phase and 9.2:85.9:4.9 for the $Pr_2(Fe,Ti)_{19}$ phase. ^{57}Fe Mössbauer spectroscopy (at 295 K) gives values for the average ^{57}Fe hyperfine field of 15.7 T for the 2:17 phase and 17.5 T for the 2:19 phase, respectively.