SURFACE MAGNETISM OF PdFe FINE PARTICLES BY MÖSSBAUER STUDY

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9.7 cm

The small-angle-polarized neutron-scattering experiments and the magnetization measurements of PdFe fine particles showed that the particle consists of two regions with different magnetic properties, i.e. the ferromagnetic core and surface layer with small magnetization [1]. However, the details of magnetism of surface layer have not been clarified. In this work, the Mössbauer measurements of PdFe fine particles with 11.0 at.% Fe have been performed at several temperatures to study the surface layer. At 77 K, the Mössbauer spectrum consists of six lines, and the hyperfine field has a peak centered approximately at 300 kOe. At 200 K, the distribution of hyperfine field consists of 3 peaks at 0, 100, 250 kOe. This indicates that the PdFe fine particle has a surface of weak ferromagnetism with lower transition temperature in addition to the ferromagnetic core. This weak ferromagnetic nature can be attributed to the lower number of nearest neighbour magnetic atoms in the surface region that lead to unstable magnetic ordering.

[1] T. Taniyama, E. Ohta, T. Sato and M. Takeda, Phys. Rev. B **55** (1997) 997

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