

# Electron transfer and novel magnetic behavior in hydrogenated FePd

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## Abstract

In this study, the magnetic moment of Fe in FePd alloy system was increased through hydrogen absorption, as confirmed by the enhanced X-ray magnetic circular dichroism (XMCD) signal of Fe. Hydrogen absorption and desorption hysteresis loop in the magnetic coercivity ( $H_c$ )-hydrogen pressure ( $P_{H_2}$ ) diagram proposed that hydrogen was absorbed at  $P_{H_2}=10$  mbar and desorbed with  $P_{H_2}=10^{-6}$  mbar. The hydrogenation effect on magnetism of FePd alloy film could be eliminated by thermal annealing without considerable hydrogen absorption. The annealing driven cyclic recovery of  $H_c$  was demonstrated because of the competition between thermal activation and H-bonding. These results clearly reveal the correlation between  $P_{H_2}$ , temperature and the magnetic properties, and provide a typical hydrogenation effect on magnetic Pd-alloys for future application.

**Keywords:** *Hydrogenation, FePd, XMCD, Magnetic domain*