

## **【M-04】**

# **Magnetoelastic coupling origin in second-order spin reorientation transition in ultrathin Co-Pd alloy films**

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We report smooth spin-reorientation transitions from in-plane to normal-to-plane direction in  $\text{Co}_x\text{Pd}_{1-x}$  alloy films with increasing Pd overlayer thickness,  $t_{\text{Pd}}$ , as seen in Fig. 1, showing characteristics of second-order transition (SOT). Magnetoelastic coupling term  $\Gamma$  plays a crucial role in such behavior via its contribution to the 4th- as well as 2nd-order anisotropy constants. The nature of SOT is characterized by  $-\Gamma_4/\Gamma_2 = 0.12-0.47$  (determined for  $x = 0.25 - 0.40$ ) in conjunction with lattice-misfit strains. It is found that reversibly oscillatory switching between in-plane and out-of-plane magnetization can be driven by deliberate strain modulation, providing an unambiguous evidence for the  $\Gamma$  origin in the observed SOT. We also report spin switching in the Co-Pd alloy films controllably engineered via the magnetoelastic origin.

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### [References]

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