

# Abundance of magnetic coupling modes in the Co/Mo multilayers

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Co/Mo layered structures display numerous interlayer coupling modes depending on the Co layer and Mo spacer thickness ( $d_{\text{Co}}$  and  $d_{\text{Mo}}$ ), repetition number, thickness and type of a buffer layer. In the low  $d_{\text{Co}}$  limit ( $< 1.5$  nm) oscillations with  $d_{\text{Mo}}$  between parallel (P) and antiparallel (AP) couplings of perpendicular magnetization in the Au/Co/Mo( $d_{\text{Mo}}$ )/Co/Au structures are observed. Thicker Co layers (3 nm) in the Mo/Co/Mo( $d_{\text{Mo}}$ )/Co/Mo systems, magnetized in the plane, exhibit P-AP-P or P-AP-BQ (biquadratic) coupling sequences with  $d_{\text{Mo}}$ , depending on the buffer thickness and repetition number. Moreover, the Mo buffer induces an additional in-plane two-fold anisotropy, contrary to Au. Observed couplings are reflected in magnetoresistance measurements. Abundance of coupling modes designates the Co/Mo system for possible applications in spintronics.

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