

Ultrathin Co-O oxide layer-driven perpendicular magnetic anisotropy in a CoO/[Co/Pd]_m multilayer matrix upon annealing

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Supplementary Information

1. Magnetic hysteresis loops of the as-grown and annealed Co capping without oxygen insertion (Stack A)

As shown in Fig. S1, Stack A with a Co capping layer containing no oxygen exhibited no clear PMA regardless of annealing, in which in-plane dominant magnetization was obtained without particular change.

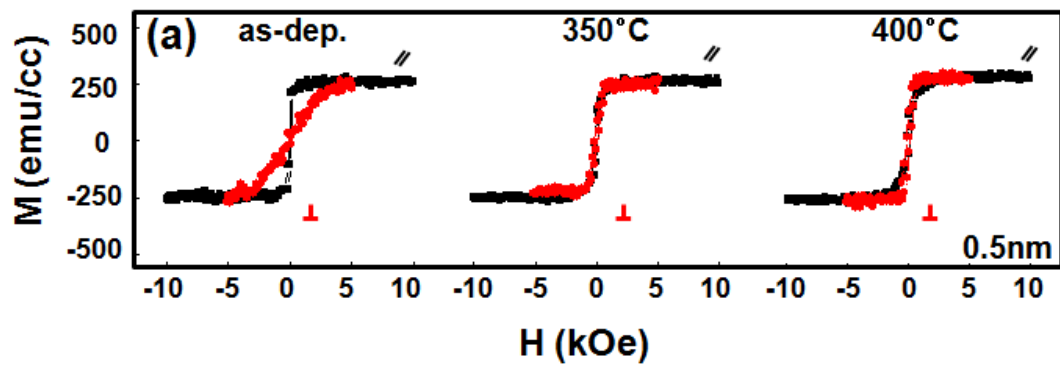


Fig. S1. Magnetic hysteresis loops of as-grown, 350°C, and 400°C-annealed Stack A, where the Co capping thickness was $t_{Co} = 0.5$ nm

2. Magnetic hysteresis loops and K_{eff} value of 425°C-annealed Stack B

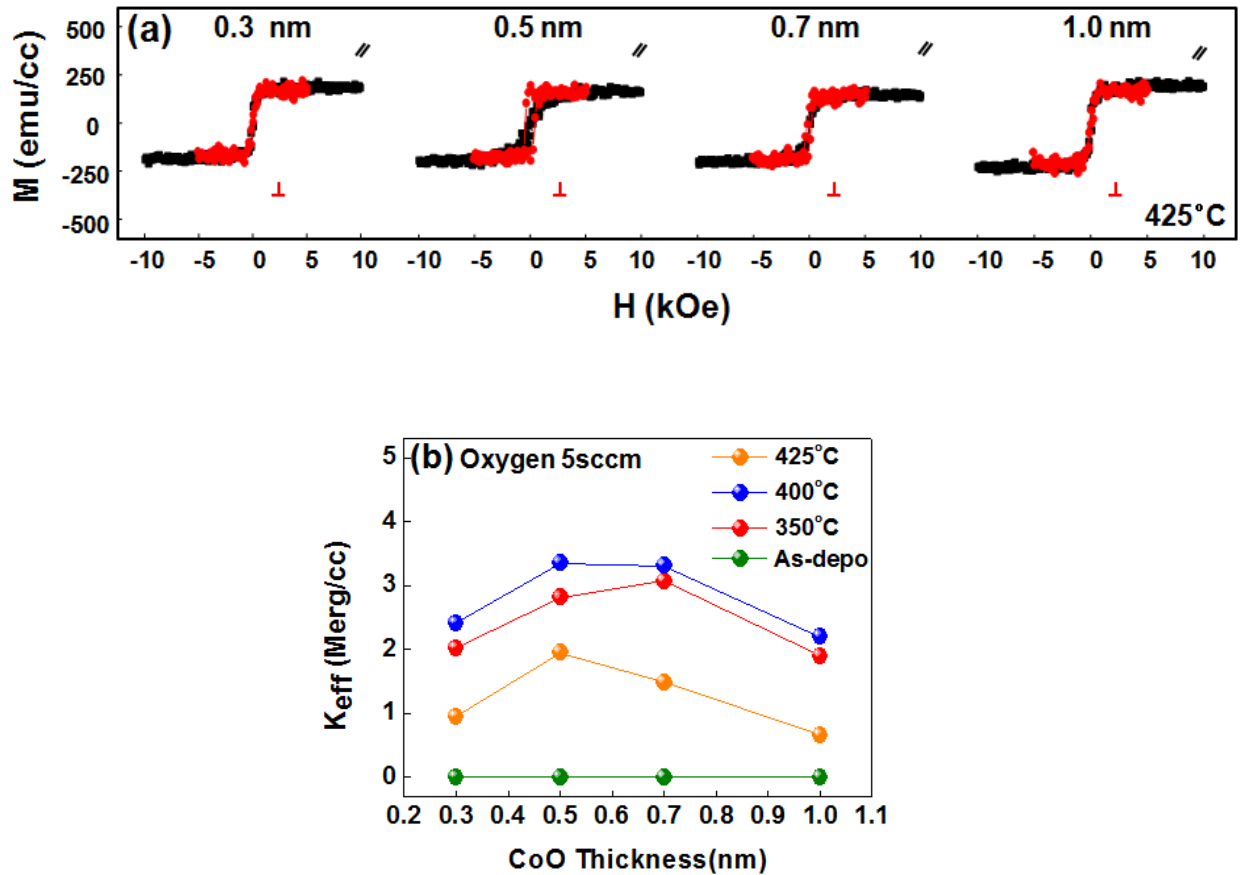


Fig. S2. (a) Magnetic hysteresis loops of 425°C-annealed Stack B, where the Co capping thickness was $t_{CoO} = 0.3 \sim 1.0$ nm, (b) effective magnetic anisotropy energy (K_{eff}) for as-grown (green line), 350°C (red line), 400°C (blue line), and 425°C (orange line) post-annealed Stack B samples as a function of CoO thickness.

3. TEM images and corresponding EDS analyses of 350°C-annealed Stack B

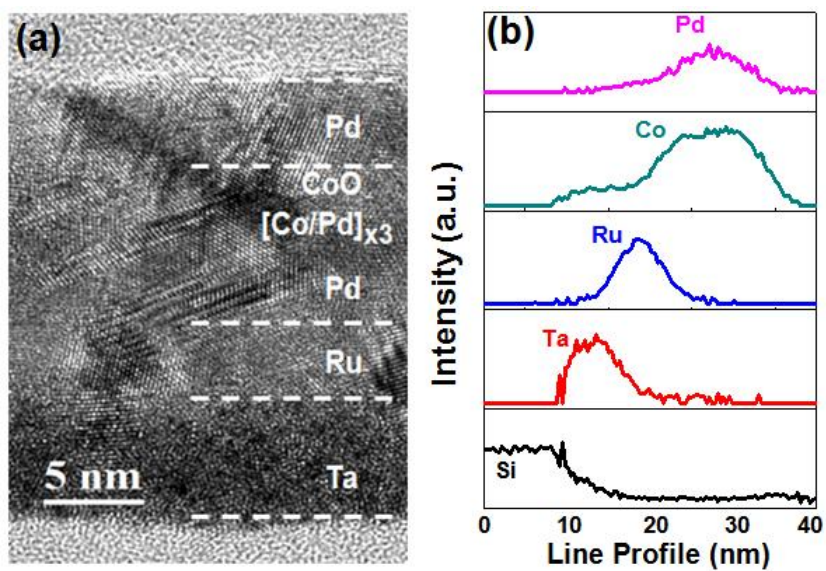


Fig. S3. (a) TEM images and (b) corresponding EDS analyses of 350°C-annealed Stack B, in which oxygen was not detected due to the extremely small amount of oxygen inside the CoO capping layer and significant out-diffusion during annealing.