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Exploring the Interlayer Exchange Coupling of Ferromagnetic Films and Nanoclusters Across MgO JARED WONG, LUCIANA RAMIREZ, ADRIAN SWARTZ, ANDREW HOFF, WEI HAN, YAN LI, ROLAND KAWAKAMI, University of California, Riverside — We investigate the interlayer exchange coupling (IEC) in Fe/MgO/Fe and Fe/MgO/Co systems. Samples are fabricated through molecular beam epitaxy (MBE) synthesis and magnetic properties are examined through magneto-optic Kerr effect (MOKE) measurements. First, comparing the bilinear coupling (J_1) observed in the Fe/MgO/Fe and Fe/MgO/Co systems, we find an enhanced coupling in Fe/MgO/Co showing that J_1 depends on magnetic material composition. Next, we embed Fe nanoclusters (NC) within the MgO spacer and find that we can tune the J_1 by varying the position the NC. Lastly, examining J_1 between ferromagnetic thin-film and NC in Fe/MgO/NC and Co/MgO/NC systems, we find a large enhancement in J_1 for Co/MgO/NC with differences larger than what is seen in the analogous thin-film systems. This amplification provides evidence for enhanced coupling due to nano-scaling effects.

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