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Enhancement of Biquadratic Coupling in Co/Fe/MgO/Fe(001) JARED WONG, YUEH-FENG CHIANG, ANDREW HOFF, XIAOJING TAN, YAN LI, KEYU PI, WEI HAU WANG, HARRY TOM, ROLAND KAWAKAMI, University of California, Riverside — One interesting aspect of the interlayer exchange coupling (IEC) across MgO is that in addition to the bilinear coupling, a biquadratic coupling favoring 90° magnetization alignment has been observed [1, 2, 3]. We investigate IEC in Co/Fe/MgO/Fe(001) and the affects of non-ideal aspects of the MgO-heterostructure, such as interface oxidation and impurities in the MgO, via molecular beam epitaxy (MBE) synthesis and magneto-optic Kerr effect (MOKE) measurements across wedged samples. By independently varying the oxygen content of the MgO film and the Fe/MgO interface, we find that the biquadratic coupling is correlated to the interfacial oxidation. Furthermore, the temperature dependence of the biquadratic coupling exhibits a strong increase at low temperatures. Our findings strongly support the loose spin mechanism as the origin of the biquadratic coupling across MgO[4]. 1. J. Faure-Vincent, C. Tiusan, C. Bellouard, et al., Phys. Rev. Lett. 89, 107206 (2002). 2. T. Katayama, S. Yuasa, J. Velev, et al., Appl. Phys. Lett. 89, 112503 (2006). 3. E. Snoeck, P. Baules, G. BenAssayag, et al., J. Phys.: Cond. Mat. 20, 055219 (2008). 4. J. C. Slonczewski, J. Appl. Phys. 73, 5957 (1993).

Jared Wong
University of California, Riverside

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