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Cross-over from antiferromagnetic to ferromagnetic interface exchange coupling in epitaxial ferromagnetic oxides SRINIVASA RAO SINGAMANENI, North Carolina State University, JOHN T. PRATER, Army Research Office, JAY NARAYAN, North Carolina State University — Interface magnetism in $\text{La}_{0.7}\text{Sr}_{0.3}\text{MnO}_3/\text{SrRuO}_3$ (LSMO/SRO) bilayer (BL) has been the subject of great interest in the recent past owing to interesting physics and potential applications. Through a novel approach [1-3], LSMO (131nm)/SRO (45nm) and LSMO (33nm)/SRO (45nm) bilayers have been epitaxially integrated with Si (100). Notably, in the former sample, positive exchange bias is observed –indication of antiferromagnetic exchange coupling and is found to be absent in the later. Interestingly, in the former sample, the cross-over from antiferromagnetic to ferromagnetic interface exchange coupling is noticed by varying the cooling field. We have verified that the coupling is of magnetic origin, not due to electrostatic interaction by inserting a thin ($\sim 10\text{nm}$) SrTiO_3 layer between LSMO and SRO. We believe that the formation of interface domain walls and strong interplay among Zeeman, anisotropy and exchange energies could play a dominant role. Our results would have important implications for the physics of magnetic exchange coupled systems.

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- [3] Narayan *et al.*, J. Appl. Phys.**93**, 278 (2003).

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