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Above room-temperature ferromagnetism in La1-xCaxMnO3 epitaxial thin films on SrTiO3(001) substrates YUNFANG KOU, Fudan University, HUI WANG, University of California, Irvine, TIAN MIAO, YANMEI WANG, Fudan University, LIN XIE, Nanjing University, SHASHA WANG, High Magnetic Field Laboratory Chinese Academy of Sciences, HAO LIU, HANXUAN LIN, YINYAN ZHU, WENBIN WANG, Fudan University, HAIFENG DU, High Magnetic Field Laboratory Chinese Academy of Sciences, XIAOQING PAN, University of Michigan-Ann Arbor, RUQIAN WU, Fudan UniversityUniversity of California, Irvine, LIFENG YIN, JIAN SHEN, Fudan University — The colossal magnetoresistive (CMR) manganites are popular materials for spintronics applications due to their high spin polarization. Only a couple of manganites like La1-xSrxMnO3 have a Curie temperature (Tc) that is higher than room temperature. Finding methods to raise the Tc of manganites over room temperature is useful but challenging. In this work, we use the most intensively studied La1-xCaxMnO3 (LCMO) as the prototype system to demonstrate that Tc can be greatly enhanced by carefully tuning the electronic structure using doping and strain. Specifically, we grow LCMO films on SrTiO3 (001) substrates using pulsed laser deposition. Magnetic and transport measurements indicate a great enhancement of Tc over room temperature at x=0.2 doping. Theoretical calculations indicate that the combined effects from doping and strain give rise to a new electronic structure favoring ferromagnetism in LCMO system. Furthermore, using the La0.8Ca0.2MnO3 as ferromagnetic electrodes, we achieve finite tunneling magnetoresistance (TMR) above room temperature.

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