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Controlling Kondo Scattering at the Conducting Oxide Interfaces via Lattice Mismatch and Growth Oxygen Pressure KUN HAN, Physics department NUSNNI-NanoCore, NUS, Singapore , SHENGWEI ZHENG, ZHEN HUANG, CHANGJIAN LI, NUSNNI-NanoCore, NUS, Singapore, WENXIONG ZHOU, NUSNNI-NanoCore,NUS, Singapore , T VENKATESAN, NUSNNI-NanoCore, NUS, Singapore, ARIANDO ARIANDO, Physics department NUSNNI-NanoCore, NUS, Singapore, ARIANDO TEAM — The interface magnetism, such as Kondo effect and ferromagnetism at the conducting interfaces between nonmagnetic oxides, has attracted great attention in recent years. In this report, we show that the interfacial Kondo scattering is enhanced by large lattice mismatch and high growth oxygen pressure. For the (001) $LaAlO_3/SrTiO_3$ interface with 3.0% lattice mismatch, the sheet resistance upturn appears around 40 K when the growth oxygen pressure P_{O2} is beyond 1 mTorr. By contrast, for the (001) $(La_{0.3}Sr_{0.7})(Al_{0.65}Ta_{0.35})O_3/SrTiO_3$ interface with 1.0% lattice mismatch, no resistance upturn is observed until P_{O2} is increased to 100 mTorr. Moreover, the magnetoresistance data confirm the resistance upturn is caused by Kondo scattering. We propose that the interface disorders, which can be induced by a large lattice mismatch and high P_{O2}, are important for forming localized Ti^{3+} ions. These Ti^{3+} ions can be spin-polarized and scatter electrons that are confined near the interface by high P_{O2}. This explains why the stronger magnetic interaction is observed at the $SrTiO_3$-based interfaces with the higher P_{O2} and larger lattice mismatch, paving the way for manipulating the interface magnetism at the functional oxide interface.

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