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Spin-polarized two-dimensional electron gas at the EuO/$SrTiO_3$ interface[1] KRISTY KORMONDY, AGHAM B. POSADAS, XIANG LI, LINGYUAN GAO, SHIDA SHEN, The University of Texas at Austin, SIRONG LU, Arizona State University, JIANSHI ZHOU, MAXIM TSOI, The University of Texas at Austin, MARTHA R. MCCARTNEY, DAVID J. SMITH, Arizona State University, ALEXANDER A. DEMKOV, The University of Texas at Austin — The development of novel nano-oxide spintronic devices could benefit greatly from interfacing with emergent phenomena at oxide interfaces. However, due to complicating factors such as thermodynamics and band alignment, the formation of such an interface is nontrivial. In this paper, we integrate highly spin-split semiconductor EuO on $SrTiO_3$ (001) by molecular beam epitaxy. Using density functional theory, we predict a spin-polarized two dimensional electron gas at the EuO/$SrTiO_3$ interface. Even at room temperature, out-diffusion of oxygen from $SrTiO_3$ during EuO epitaxy creates a highly conductive layer of oxygen vacancies on the $SrTiO_3$ side of the interface. The films are ferromagnetic with a Curie temperature of 70 K and display giant magnetoresistance below the transition temperature. Leveraging this approach to offers an as-yet unexplored route to seamlessly integrate ferromagnetism and the oxide two-dimensional electron gas.

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