

Abstract Submitted
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Curie temperature of electron-doped EuO - is there an intrinsic limit? A. SCHMEHL, T. MAIROSER, University of Augsburg, Augsburg, Germany, A. MELVILLE, T. HEEG, Cornell University, Ithaca, N.Y., USA, L. CANELLA, P. BÖNI, Technische Universität München, Garching, Germany, W. ZANDER, J. SCHUBERT, Forschungszentrum Jülich GmbH, Jülich, Germany, D.E. SHAI, E.J. MONKMAN, K. M. SHEN, D.G. SCHLOM, Cornell University, Ithaca, N.Y., USA, J. MANNHART, University of Augsburg, Augsburg, Germany — Increasing the Curie temperature (T_C) of the ferromagnetic semiconductor europium monoxide is the key problem to make this versatile material attractive for wide use. Its half-metallic behavior and its structural and electronic compatibility with Si, GaN and GaAs make EuO a promising material for semiconductor-based spintronics. By doping EuO with donor impurities, T_C can substantially be increased. This increase is attributed to an additional exchange interaction that is mediated via the conduction electrons. Here we report on Hall measurements on Gd doped EuO films grown over a wide range of doping concentrations and growth conditions. We demonstrate that only a small fraction of the introduced impurities actually act as donors even for optimized growth parameters. Too high growth temperatures even render the dopants completely inactive. These results open the exciting question, if further raising the charge carrier density will elevate the Curie temperature way above today's maximum value of 170 K.

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