

Abstract Submitted  
for the MAR11 Meeting of  
The American Physical Society

**The Effect of Lu Doping on Ferromagnetic EuO** ALEXANDER MELVILLE, Cornell University, THOMAS MAIROSER, ANDREAS SCHMEHL, JOCHEN MANNHART, University of Augsburg, DARRELL SCHLOM, Cornell University, CORNELL UNIVERSITY TEAM, UNIVERSITY OF AUGSBURG COLLABORATION — Europium Oxide (EuO) is a poorly understood ferromagnetic semiconductor whose spin-ordering temperature ( $T_C$ ) can be greatly influenced by the inclusion of dopants such as oxygen vacancies or one of several trivalent ions. The ability to grow high-quality crystalline and stoichiometric EuO by adsorption-controlled growth using molecular-beam epitaxy is imperative in separating the effect of oxygen vacancies from that of trivalent dopants. In this study, we have prepared 5% Lu-doped EuO and characterized the effects of this doping on the magnetic and electronic properties. We show for the first time that Lu is a viable dopant material for EuO, increasing the  $T_C$  up to 120K as a result of an increase in the carrier concentration to  $1.8 \times 10^{26} \text{m}^{-3}$  from  $1.0 \times 10^{23} \text{m}^{-3}$ . This is on par with other EuO films grown in an adsorption-controlled environment and doped with La or Gd. Furthermore, we find that EuO maintains a high spin-polarization (>80%) at this doping level. As a result of the simultaneously high  $T_C$  and high spin-polarization, EuO can be considered for spintronic applications at much higher temperatures than possible for undoped EuO.

Alexander Melville  
Cornell University

Date submitted: 03 Nov 2010

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