Abstract Submitted
for the MAR06 Meeting of
The American Physical Society

Large spin polarization in $Ga_{1-x}Mn_xP$ synthesized by ion implantation and pulsed-laser melting M.A. SCARPULLA, P.R. STONE, R. FARSHCHI, I.D. SHARP, E.E. HALLER, O.D. DUBON, Dept. of Materials Science and Engineering, University of California and Lawrence Berkeley National Laboratory, Berkeley CA 94720, J.W. BEEMAN, Lawrence Berkeley National Laboratory, Berkeley, CA 94720, E. ARENHOLZ, Advanced Light Source, Lawrence Berkeley National Laboratory, Berkeley, CA 94720 — We have recently demonstrated that the mediating holes in $Ga_{1-x}Mn_xP$ reside in an impurity band separated from the valence band by a gap [Scarpulla *et al.*, Phys. Rev. Lett. **95** 207204 (2005)]. For samples with x≈0.06 and Curie temperature 60 K, this gap is approximately 25 meV. In this work, we demonstrate a very large spin polarization of states near the Fermi level across a range of Mn compositions using Mn $L_{3,2}$ X-ray magnetic circular dichroism (XMCD). We find that the X-ray absorption spectrum at the Mn $L_{3,2}$ edge is very similar to that observed in $Ga_{1-x}Mn_xAs$ [Edmonds *et al.*, Appl. Phys. Lett. **84** 4065 (2004)], indicating that the Mn bonding environment is similar between $Ga_{1-x}Mn_xAs$ and $Ga_{1-x}Mn_xP$. The magnitude of the X-ray fluorescence XMCD signal reaches approximately 70% at the Mn L_3 edge across the range of compositions, indicating a large spin asymmetry in the density of states. This is consistent with (but not exclusive to) the existence of a spin-polarized impurity band near the Fermi level.

Dept. of Materials Science and Engineering, University of California and Lawrence Berkeley National Laborato

Date submitted: 30 Nov 2005 Electronic form version 1.4