Ferromagnetism in InMnAsP epitaxial films NIDHI PARASHAR, PHILIP CHIU, BRUCE WESSELS, Northwestern University — The magnetic properties of epitaxial In$_{1-x}$Mn$_x$As$_{1-y}$P$_y$ deposited by metal-organic vapor phase epitaxy were investigated in order to study matrix effects. Alloy concentrations of 0.01 $< x < 0.04$ and 0.10 $< y < 0.25$ were evaluated. Films have excellent crystallinity with x-ray rocking curve width of 0.14 degrees. Films were ferromagnetic over the entire composition range studied. The field cooled and zero field cooled magnetization curves exhibit irreversible behavior. A $T_c$ of 318 K was also measured from the field cooled magnetization temperature dependence. Both the irreversibility and the $T_c$ are indicative of the formation of hexagonal MnAs precipitates. The presence of phosphorus promoted the nucleation of hexagonal MnAs precipitates, presumably as the result of the larger mismatch between the matrix and metastable cubic MnAs clusters, as compared to InMnAs.

Bruce Wessels
Northwestern University

Date submitted: 15 Nov 2006

Electronic form version 1.4