

Abstract Submitted  
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**Local moment and interaction of manganese moment in amorphous silicon thin films** LI ZENG, University of California, San Diego, FRANCES HELLMAN, University of California, Berkeley, ROBERT CULBERTSON, RAFIQUUL ISLAM, DAVID SMITH, Arizona State University, ERIK HELGREN, University of California, Berkeley — Highly homogeneous Mn doped amorphous silicon ( $a\text{-Mn}_x\text{Si}$ ,  $x = 1\sim 18$  at.%) samples are prepared by e-beam co-evaporation to explore the local Mn moment in  $a\text{-Mn}_x\text{Si}$ . The relationship between the microstructure and the magnetic properties has been investigated. HR-XTEM shows that Mn atoms are uniformly distributed inside the amorphous silicon matrix, greatly exceeding the Mn solubility in crystalline silicon. Rutherford backscattering (RBS) is used to verify the film composition and the oxygen impurity. The effective moment of Mn has a nontrivial Mn composition dependence. The smaller the Mn concentration, the larger the Mn effective moment is found. The saturation moment of the sample is small, indicating a small Mn local moment. Possible explanations of the small effective moment and its concentration dependence are discussed, including direct antiferromagnetic interaction, s-d interaction. Magnetotransport is also studied for this system and magnetoresistance is found very small comparing to other magnetically doped amorphous semiconductor, such as  $a\text{-Gd}_x\text{Si}_{1-x}$ .

Li Zeng  
University of California, San Diego

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