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Local Environment Effects on Single Zn and Mn Acceptors in Gallium Arsenide NANCY SANTAGATA, DONGHUN LEE, JAY GUPTA, The Ohio State University — The ability to precisely control the properties of single dopants in semiconductors is of interest not only for the improvement of current technologies but also for the development of next generation devices. Recent work in our group has exploited the single atom precision afforded by a scanning tunneling microscope to explore how the properties of dopants in gallium arsenide depend on their local environment. Specifically, we have shown that Zn dopants located within the same layer and occupying identical binding sites exhibit dissimilarities that are dependent upon the proximity to neighboring subsurface Zn acceptors.(1) Further, we demonstrated control of the ionization state of single Mn acceptors by both defect- and tip-induced band bending.(2) Finally, we achieved tunable control over the binding energy of Mn acceptors by varying the proximity to charged As vacancies.(3) This talk will review these findings and elaborate on the application of these techniques to characterize defects in wide bandgap materials, where the origin of properties like ferromagnetism are not yet well understood. 1. Appl. Phys. Lett. 99, 053124 (2011). 2. Nano Lett. 11, 2004 (2011). 3. Science 330, 6012 (2010).

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