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Evolution of transition metal dopant properties near the GaAs surface ANNE BENJAMIN, JAY GUPTA, Ohio State Univ - Columbus — As electronic devices get smaller, individual defects become more important, and surface layers and interfacial regions constitute a greater proportion of the material in the device. We use scanning tunneling microscopy (STM) to examine the layer dependence of electronic properties of near-surface level 3d transition metals in gallium arsenide. Some transition metal dopants have been shown to have layer-dependent properties; manganese atoms are deep defects in surface layers and shallow defects in the bulk, while surface-layer zinc atoms can be shallow or deep defects depending on the proximity of other, subsurface zinc defects. By depositing a selected metal on our GaAs sample, and annealing to diffuse defects into the first few layers, we can study the layer dependence of a wide range of defects. At present, the different surface and subsurface properties of defects in semiconductors can only be studied after doping during growth or through individual placement of atoms. A diffusion method will allow for greater flexibility in the type and density of defects able to be studied with STM.

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