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Magnetic and electronic properties of Mn acceptors in the (110) GaAs surface and subsurface layers P.M. KOENRAAD, J.K. GARLEFF, M. BOZKURT, A.P. WIJNHEIJMER, Eindhoven University of Technology, P. STRUDER, B. BRYANT, N.J. CURSON, C.F. HIRJIBEHEDIN, University College London, M.E. FLATTÉ, University of Iowa — Scanning tunneling spectroscopy and topography measurements were performed on Mn doped GaAs at low temperature and in high magnetic fields. Mn acceptors in the (110) surface and subsurface layers of gallium arsenide were identified and analyzed. The Mn induced spectroscopic features appearing in the bandgap region of GaAs were analyzed as a function of the depth of the Mn acceptor below the surface and showed a clear depth dependence. By accurately modeling the tip induced band bending the binding energy of a hole to a Mn acceptor could be determined and an increase of this binding energy was observed when the Mn acceptor approaches the surface. This result agrees with a recently reported enhanced binding energy, as observed by STM, for an electron bound to a Si donor that is close to a (110) GaAs surface and a theoretical predicted binding energy enhancement for Mn acceptors close to the (110) GaAs surface. The topographic features of Mn acceptors appearing at different depths below the surface were analyzed in magnetic fields up to 6 T perpendicular to the surface and up to 1 T in the plane of the of the surface. No change of the contrast was observed.

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