

Abstract Submitted
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Valence state manipulation of single Fe impurities in GaAs PAUL KOENRAAD, JUANITA BOCQUEL, Eindhoven University of Technology, VICTORIA KORTAN, MICHAEL FLATTE, University of Iowa, RICHARD CAMPION, BRYAN GALLAGHER, University of Nottingham — Cross-sectional STM was used to characterize Fe doped GaAs. We show that, by controlling the tip-induced band bending, Fe atoms can be brought from their isoelectronic state (Fe³⁺)-3d⁵ state into their (Fe²⁺)-3d⁶ ionized acceptor state. This STM-induced valence manipulation that involves the (de)population of the d-shell of the Fe atom differs from our previous experiments on Mn-acceptors and Si-donors where we changed its charge state by adding or removing a valence band hole or a conduction band electron respectively that is bound by the impurity. In addition for specific tunneling conditions a peculiar contrast is observed under which Fe atoms appear as dark anisotropic features.

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