Abstract Submitted
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Individual iso-electronic N and Bi centers in GaAs studied by Scanning Tunneling Microscopy. PAUL KOENRAAD, CHRISTIAN KRAMMEL, RIANNE PLANTENGA, Eindhoven University of Technology, VICTORIA KORTAN, MICHAEL FLATT, University of Iowa, FREDDY TILLEY, MERVIN ROY, PETER MAKSYM, University of Leicester, TAKASHI KITA, Kobe University — Nitrogen and bismuth iso-electronic doping centers in GaAs have received considerable interest in the last few years due to their peculiar behaviour in dilute nitrides and bismides. In these materials effects such as a strong band bowing and the formation of resonant states in respectively the conduction and valence band have been reported. In this contribution we will report our exploration of individual nitrogen and bismuth atoms in the outermost layers of a freshly cleaved (110) GaAs surface by STM. Depending on the tunnel conditions we are able to either visualise the lattice distortion or image the charge distribution of the resonant state. We clearly observe that nitrogen pulls its neighbouring atoms inwards whereas bismuth pushes its neighbouring atoms away. A straightforward geometrical model based on the covalent radii of the dopants and substrate atoms is used to interpret the observed crystal deformation seen in our STM images of nitrogen and bismuth under the appropriate tunnel conditions. At small positive voltages we could observe the charge distribution of the resonant state induced by iso-electronic nitrogen atoms in GaAs. Tight Binding Modelling (TBM) was used to explain the observed strongly anisotropic charge distribution.

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