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Charge States of Individual Group V Donors on n-doped Si(111)-(2x1) Surface[1] VERONIKA BRAZDOVA, PHILIPP STUDER, CYRUS F. HIRJIBEHEDIN, STEVEN SCHOFIELD, NEIL J. CURSON, DAVID R. BOWLER, University College London — Functionality of semiconductor devices now relies upon only a few atoms and study of individual dopants in silicon has thus been rapidly growing in importance. Group V donors are especially interesting due to their potential applications in quantum computing and spintronics. The charge state of the dopants is of fundamental importance for conventional semiconductor devices as well as in concept QIP and spintronic devices. We combine density functional theory simulations and ion implantation and cross-sectional scanning tunneling microscopy (XSTM) to study individual Group V donors in cleaved n-doped Si(111)-(2x1) surface. We present a detailed analysis of the dopant-induced charging effects and discuss the surface charge dependence on the local reconstruction induced by the individual dopants.

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