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An STM and STS study on Iridium modified Si(111) Surface[1]

NURI ONCEL, DYLAN NICHOLLS, University of North Dakota — The structure of Si(111) $\sqrt{7} \times \sqrt{7}\, R\, 19.1^0 - Ir$ reconstructed surface have been investigated with the help of scanning tunneling microscopy/spectroscopy and low energy electron diffraction. We propose a model based on the experimental data. The model defines a unit cell containing one surface substitutional iridium atom centered under six silicon ad-atoms. Once the sample is annealed at 1200 °C, a low density lattice gas of these ring clusters forms on top of an impurity stabilized $'1 \times 1'$ domains. These ring clusters and $'1 \times 1'$ domains co-exist with 7×7 domains of clean Si(111) surface. The local density of states graphs measured on Si(111) $\sqrt{7} \times \sqrt{7}\, R\, 19.1^0 - Ir$ reconstructed surface contains an asymmetric peak at the edge of the valence band suggesting that there is a surface state exhibiting a Rashba type spin-orbit coupling.

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