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**S-W06**

## **Atomic structures of impurity atoms incorporated in the Si(001)-2x1 surface**

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Current semiconductor devices are made of various kinds of thin layers to control the charge carriers effectively. To extract the highest performance from the electronic devices, the structures of impurity atoms embedded below the Si(001) surface should be elucidated. Through quantitative measurements by Scanning Tunneling Microscopy in combination with the first principle calculations, these long-standing problems of atomic structures of impurity atoms near the Si(001)-2x1 surface can be resolved. The initial carbonization of the Si(001)-2x1, for example, could be successfully solved by this approach. Other long-standing problems of impurity atoms incorporated in Si(001) can be solved by the precise and quantitative measurements.