

Abstract Submitted
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Chemical fingerprinting at the atomic level with scanning tunneling spectroscopy KOJI S. NAKAYAMA, Department of Materials Science and Engineering, UIUC, and IMR, Tohoku University, TOMOKO SUGANO, Department of Materials Science and Engineering, UIUC, KENJI OHMORI, Frederick Seitz Materials Research Laboratory, UIUC, A.W. SIGNOR, J.H. WEAVER, Department of Materials Science and Engineering, UIUC — Atomic-scale chemical analysis has been a long-standing goal of materials characterization. It requires the ability to interrogate individual atoms and to recognize their distinguishing signatures. Scanning tunneling spectroscopy based on scanning tunneling microscopy makes it possible to map the local electronic density of states for clean surfaces and for those with adsorbates at 80 K. We have developed a protocol that allows us to obtain the spectral fingerprints of halogen atoms on Si(001), and we use those fingerprints to distinguish between adatom species for surfaces with Cl and Br mixed adsorbates. The key to the process is the energy distribution of the antibonding states that depend on the halogen species. The protocol developed here, with its emphasis on the distribution and distinction of energy states, should be applicable to other systems, and should yield new insights regarding chemical identification.

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