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**‘Wavefunction’ Imaging in Complex New Materials**

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Advanced scanning tunneling microscopy techniques now allow one to image not only the locations of the atoms in a material, but also the quantum mechanical wavefunction of the electrons which move through it. This means that one can explore directly the quantum mechanical environment within new electronic materials, learning how their exotic properties are generated at the atomic scale. I will discuss how these new ‘wavefunction’ imaging techniques work and show several examples of studies in which they revealed startling new insights into what is actually occurring inside complex new materials.