

Defects and electronic properties of transition metal oxides

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The concept of electronic inhomogeneity is central to the science and technology of transition metal oxides, including both the manganites as well as the high temperature superconductors. We describe recent scanning tunneling microscopy and X-ray experiments where we both characterize and control the responsible defects. In particular, we show the first direct images of oxygen adatom - vacancy pairs and their motion, including bistability and electric field induced switching - ultimately responsible for memristive action - alongside their effects on the electronic density of states. Furthermore, we have used X-ray microscopy first to establish the extraordinary inhomogeneity, due to ordered oxygen defect domains, of an “optimally” prepared high temperature superconductor, and then as a lithographic tool to “write” superconducting wires.

References

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