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Metallic "Defect Wires" in a Semiconducting Oxide

Intellectual Merit

Semiconductors, which have electrical properties in between metals and insulators, are the building blocks of devices like transistors that fuel computer technology. New semiconducting materials that could outperform existing ones are continuously sought in science and engineering, with oxides being one contender. In recent work in the University of Minnesota MRSEC, researchers studying one such oxide semiconductor - barium tin oxide - made the startling discovery of a completely new type of "line defect". Defects are common in semiconductors, in some cases being required for their operation, but this defect essentially forms an electrically conductive "defect wire" in the semiconducting material, which is extremely unusual. Such defects open up exciting new possibilities in terms of controlling the one dimensional motion of electrons in semiconductors, potentially leading to new types of electronic devices. .

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