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Strontium titanate transformation to highly conductive nanolayers VLADIMIR BUTKO, Brookhaven National Laboratory, DAVID REAGOR, Los Alamos National Laboratory — Developing fabrication methods for electronically active nanostructures is an important challenge of modern science and technology. Fabrication efforts for crystalline materials have been focused on state-of-the-art epitaxial growth techniques. These techniques are based on deposition of precisely controlled combinations of various materials on a heated substrate. We report a method that does not require deposition and transforms a nanoscale layer of a complex crystalline compound into a new material using low energy Ion Beam Preferential Etching (IBPE). We demonstrate this method by transforming a widely used insulator model system, SrTiO₃, into a transparent conductor. Most significantly, the resistivity decreases with decreasing temperature as 2.5 power of T and eventually falls below that of room temperature copper. These transport measurements imply a crystal quality in the conduction channel comparable to that obtained with the highest quality growth techniques. The universality of low energy IBPE implies wide potential applicability to fabrication of other nanolayers. David W. Reagor, Vladimir.Y. Butko, Nature Materials, v.4, 593, August 2005.

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