

Abstract Submitted
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Novel Electronically Conducting Tellurium Oxides¹ MAS SUBRAMANIAN, THEERUNAN SIRITANON, ARTHUR SLEIGHT, DEPARTMENT OF CHEMISTRY, OREGON STATE UNIVERSITY, CORVALLIS OR 97331 TEAM — Tellurium oxides seldom show measurable electronic conductivity. Tellurium oxides that appear to have Te^{5+} contain Te^{4+} and Te^{6+} in two distinct crystallographic sites and are electronic insulators. Here we report on the synthesis and characterization of several new tellurium rich oxides of the general formula, $\text{CsM}_x\text{Te}_{2-x}\text{O}_6$, crystallizing in modified pyrochlore structure. Most of the compounds reported here are black in color with some exhibiting good electronic conductivities (2 S/cm) and Seebeck measurements indicate all are n-type. The observation of high electronic conductivities in compounds like $\text{CsGe}_{0.5}\text{Te}_{1.5}\text{O}_6$, $\text{CsAl}_{0.33}\text{Te}_{1.67}\text{O}_6$ confirms that observed conductivity is arising from doping of electrons into the empty 5s orbitals of Te^{6+} . This reduction is apparently accompanied with some small deviation from the ideal formula: oxygen content and/or ratio of cations on octahedral sites. This is in consistent with single-crystal X-ray as well as powder neutron diffraction structure refinements and the observed sign of the Seebeck coefficient. To our knowledge, this is a first observance of high electrical conductivity in mixed valent tellurium oxides.

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