

Non-Perovskite Ruthenates and Layered Cobalt Oxides – New Materials with Unexpected Electronic Properties

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Working primarily with collaborators in the Department of Physics at Princeton (N.P. Ong et. al.) and at Los Alamos National Laboratory (A.P. Ramirez, et. al.) we have recently been studying the structure-property relationships in non-perovskite ruthenates, and alkali cobalt oxides with triangular cobalt-oxygen layers. Though the perovskite ruthenates have been well-studied by others, more complex crystal structures offer the possibility of mixing the effects of metal-metal orbital overlap into the “simpler” metal-oxygen and oxygen-oxygen states offered by the standard perovskites. I will present our results on KSbO₃-type and Hollandite-type ruthenates La₄Ru₆O₁₉ and Bi₃Ru₃O₁₁, and A_xRuO₂, respectively, to illustrate this point. The complex chemistry of the Na_xCoO₂·yH₂O superconductor makes determination of structure-property relations in this and related materials unusually difficult. I will also describe our recent results in this area.