Thermoelectric oxides: important role of the electronic correlations

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As compared to the physics of the degenerated semiconductors which is used to describe the classical thermoelectric materials such as Bi_2Te_3, thermoelectric oxides are characterized by their strongly correlated electrons. This leads to very different behaviors which depend on the transition metal, its electronic configuration and the crystallographic structure.

For the Chemists, oxides form an ideal playground to tailor new thermoelectric oxides by spin/orbital engineering or nanostructuration or co-doping. Several examples will be used to give a general review of the best thermoelectric oxides in the perspective of their use as p and n-legs of thermoelectric generators to recover waste-heat.