

# The Great Potential of Transition Metal Oxides as Functional Materials

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## Abstract

The great ability of transition elements to adopt various oxidation states, influences dramatically the physical properties and especially the magnetic and transport properties of the transition metal oxides. In this respect, copper, cobalt and manganese oxides are of great interest due to the existence of mixed valencies Cu(II)-Cu(III), Co(III)-Co(IV), Mn(III)-Mn(IV) which involves complex electronic configurations for the d element, as well as various spin configurations. We describe herein the great potential of these oxides either as ceramics or wires, or as thin films for the realisation of functional materials. Copper oxides with a layered structure have been studied for their superconducting properties at "high temperature". These high T<sub>c</sub> materials are actually explored for various applications such as fault current limiters, detectors (SQUIDS), current leads, magnetic bearings. Cobalt oxides with a layered structure, due to their high positive thermoelectric power are presently investigated for the conversion of heat into electricity, especially from the environmental viewpoint on trucks and cars. Finally manganese oxides, due to their colossal magnetoresistance (CMR) properties present a great potentiality in spintronics for the magnetic storage of information but also for the realisation of magnetic detectors and actuators.