

# Resistivity and Carrier Mobility of the $\text{SmBa}_2\text{Cu}_3\text{O}_{6+x}$ Superconductor with Different Oxygen Doping Levels

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DC conductivity measurements between 15 and 300 K are reported for  $\text{SmBa}_2\text{Cu}_3\text{O}_{6+x}$  samples with different oxygen doping amounts ( $x$ ) produced by annealing under appropriate high temperature and oxygen pressure conditions and quenching.

Samples with  $x \geq 0.5$  are superconductors:  $T_c \sim 60$  K at  $x = 0.7$ ,  $T_c > 80$  K at  $x = 0.9$ . The transition from superconduction to non-superconduction corresponds to the tetragonal to orthorhombic structural transition and to the transition from semiconducting to metallic temperature dependence of the resistivity.

Oxygen doping causes a sudden increase of hole mobility near  $x = 0.5$ . Below this threshold, the behavior of the carrier mobility is in agreement with an Anderson localization.