

# Abstract

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## **Superconducting Properties of (Tl<sub>1.6</sub>Pb<sub>0.4</sub>)-2223 Substituted by Praseodymium**

The lattice parameters, electrical resistivity, ac magnetic susceptibility, magnetoresistance and Hall effect have been measured for a newly developed compound obtained through partial substitution of Ca<sup>2+</sup> ions by Pr<sup>3+</sup> ones in (Tl<sub>1.6</sub>Pb<sub>0.4</sub>)Ba<sub>2</sub>Ca<sub>2</sub>Cu<sub>3</sub>O<sub>10- $\delta$</sub> . For such compound, the prepared samples are almost single phase of (Tl, Pb)-2223 tetragonal unit cell with a space group  $I4/mmm$ . An opposite behavior for both lattice parameters  $a$  and  $c$  was observed as the concentration of Pr-content was increased. Also, metallic tendency was observed from electrical resistivity measurements in the range of  $0 < x < 0.15$  for temperature values above the superconducting transition temperature  $T_c$ . On the other hand, a semiconductor-like behavior was noticed for values  $x > 0.15$ . Suppression in the superconducting transition temperature was found as the Pr-content was increased. This suppression in superconductivity for the system evolved was discussed according to two models point of views; the Cooper-pair breaking and hole-filling models. The transverse magnetoresistance, below the superconducting transition temperature, was measured in a weak magnetic field up to 4.8 kG. Finally, the Hall voltage was measured at different temperature values above that of superconducting transition using five-probe technique. The Hall coefficient, Hall mobility and Hall angle were expressed as functions of both temperature and Pr-content.