

Correlation between the Superconducting Transition Temperature and
Madelung Site Potential Difference in YBa₂Cu₃O_x

Yang, T. J. ; Horng, Lance

Abstract

The Madelung site potentials have been calculated in YBa₂Cu₃O_x system in order to find the role of the difference in the Madelung site potentials ΔV_T and ΔV_M within the ionic model. The bond valence sum of each of the ions in the YBa₂Cu₃O_x compound is assigned as charge of the corresponding ion in the calculation of the Madelung site potential. Correlations between $\Delta V = 0.75 \Delta V_M + 0.25 \Delta V_T$ obtained and superconducting transition temperature T_c are examined and found qualitatively very good agreement with the well-know experimental result for the various oxygen content x . This also supports that the usual believing ΔV_M is of primary important parameter to control T_c . The reason will be argued in this paper.