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Identification of the high-temperature superconducting phase in the Y-Ba-Cu-O system as the perovskite $YBa_2Cu_3O_{7\pm\delta}$

P GANGULY, R A MOHAN RAM, K SREEDHAR and C N R RAO*

Solid State and Structural Chemistry Unit, Indian Institute of Science, Bangalore 560 012, India

Abstract. The oxide responsible for high-temperature superconductivity (onset ~ 100 K, zero resistance above liquid N_2 temperature) is found to be $YBa_2Cu_3O_{7\pm\delta}$.

Keywords. High-temperature superconductivity; $YBa_2Cu_3O_7$

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The discovery of superconducting oxides of the Y-Ba-Cu-O system, exhibiting zero resistance above the liquid nitrogen temperature (Wu *et al* 1987; Ganguly *et al* 1987), has received worldwide attention. The oxide compositions which have shown this behaviour seem to be complex and biphasic. The $Y_{1\cdot2}Ba_{0\cdot8}CuO_4$ composition of Wu *et al* (1987), based on the analogy with $La_{2-x}Ba_xCuO_4$ possessing the K_2NiF_4 structure (Chu *et al* 1987; Rao and Ganguly 1987), consisted of a green and a black oxide. We suspect that the green oxide was Y_2BaCuO_5 which is an insulator. We did not prepare Y-Ba-Cu oxides with compositions related to those of K_2NiF_4 structure since Y_2CuO_4 itself is not formed in this structure. Instead, we made Y-Ba-Cu oxides analogous to $La_3Ba_3Cu_6O_{14}$ (Er-Rakho *et al* 1981) which is an oxygen-deficient perovskite possessing a

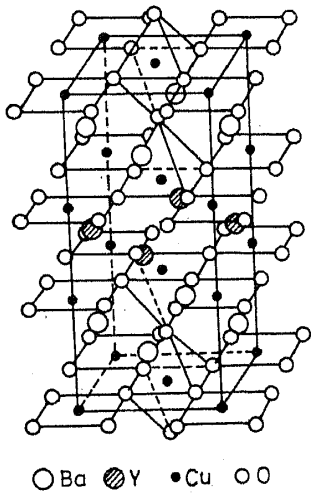

Figure 1. Proposed structure of $Y_2Ba_4Cu_6O_{14\pm\delta}$ analogous to $La_3Ba_3Cu_6O_{14}$ (following Er-Rakho *et al* 1981). A_1 and A_2 sites are shown. Y occupies A_2 sites preferentially.

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* To whom all correspondence should be addressed