

ELASTIC PROPERTIES OF $\text{EuBa}_2\text{Cu}_3\text{O}_{7-\delta}$ CERAMICS AT LOW TEMPERATURES

M. F. Bakar and A. K. Yahya

*Faculty of Applied Sciences, Universiti Teknologi MARA,
40450 Shah Alam, Selangor, Malaysia*

ABSTRACT

Ultrasonic velocity measurements on single-phase polycrystalline $\text{EuBa}_2\text{Cu}_3\text{O}_{7-\delta}$ superconducting ($\delta \sim 0.1$) and non-superconducting ($\delta \sim 0.7$) samples have been performed at 9 MHz from 80 K to 280 K in longitudinal mode and from 80 K to 200 K in shear mode. The absolute longitudinal and shear velocities (at 80K) decreased when the oxygen content was reduced from $\text{O}_{6.9}$ to $\text{O}_{6.3}$. For the superconducting sample, a step-like anomaly was observed around 255 K indicating pronounced lattice stiffening in the longitudinal mode. However, a similar observation was not observed in the shear mode possibly due to the lower temperature limit. In addition, no elastic anomalies were observed for the non-superconducting sample in both longitudinal and shear modes. The elastic anomaly was discussed in terms of a phase transition involving oxygen ordering in Cu-O chains. Elastic moduli values and Debye temperature (θ_D) are also reported.

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