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Synthesis and Superconductivity of Y-Based Superconductors with Addition of Antimony Oxide

We are reporting the effects of the addition of Sb2O3 on the electric and magnetic properties of Y-based high temperature superconductors. Samples with composition YBa2Cu3SbxOy (x=0.00 –2 wt.%) were prepared by the solid-state reaction method. The starting powder was mixed in a ball mill for 1 hour. The heat treatment schedule was: first dried powders at 120℃ for 4 h, raised temperature at a rate of 1℃/h up to 925℃ and held at this temperature for 15 h, after was quenched to room temperature and reground thoroughly in a ball mill for 5 hours. The powder again was heated at 925℃ for 15 h. This process we twice repeated and finally the total time of synthesis of powders at 925℃ temperature was 60 h. The resulting powders were ground and pressed into the pellets of 6 mm diameters and 2 mm thickness by a hydraulic press with about 900 MPa. These pellets were sintered in air at 925℃ for 50 h. The samples were allowed to cool at the rate of 1℃/h to room temperature. The structure of the obtained materials was determined by XRD. Ac susceptibility and high harmonic response of polycrystalline superconductors un-doped and Antimony-doped samples were measured in the presence of small ac excitation field and dc magnetic field applied on them. Finally, we observed that, the presence of antimony oxide made the system more reactive and enhanced the kinetic of reaction, as well as the promotion of the high-Tc phase.

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