

Magnetic Hysteresis Loops of the Polycrystalline Superconductors $\text{SmBa}_2\text{Cu}_3\text{O}_x$

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The polycrystalline superconductors $\text{SmBa}_2\text{Cu}_3\text{O}_x$ are fabricated, and intergranular magnetic properties are investigated using critical state model, from which some useful parameters such as critical current density and the intergranular volume fraction are obtained. From the curve fitting for M-H hysteresis loop, the intergranular critical current density of $\text{SmBa}_2\text{Cu}_3\text{O}_x$ is found to decrease in the form of $(1-T/T_c)^{1.5}$. The intergranular volume fraction is influenced by granular morphology. From SEM image, the grains of $\text{SmBa}_2\text{Cu}_3\text{O}_x$ are found to be randomly shaped. This means that the intergranular volume fraction of $\text{SmBa}_2\text{Cu}_3\text{O}_x$ should be smaller than that of a superconductor, of which grains are plate-shaped such as Tl-based superconductor.

keywords : M-H hysteresis loop, critical state model, $\text{SmBa}_2\text{Cu}_3\text{O}_x$