

A Comparative Study on Field, Temperature and Strain Dependence of the Critical Current for Doped and Un-Doped MgB₂ Wires Based on the Percolation Model

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Field, temperature and strain dependence of the critical current for a SiC doped multi-filamentary in-situ MgB₂ wire has been studied. Measurement results were compared with that of the un-doped wire and the origin of the difference in the critical current is discussed. The critical current can be calculated with the percolation model considering the effect of anisotropy. The temperature dependence of the fitting parameters, the upper critical field along the ab-plane and c-axis is compared with the dirty-limit two-gap theory. To assess the validity of the fitting parameters, resistive transition has been measured especially to extract the upper critical field directly. It is shown that even the resistive broadening can be well explained by a simple parallel path model using the fitting parameters obtained from the critical current analysis.

Keywords : MgB₂, SiC doping, critical current, percolation model, strain dependence