

Enhancement in critical current density and irreversibility field of bulk MgB₂ by C and CaCO₃ co-addition

Abstract

Paper ash, a source of C and CaCO₃, was used for the first time as a cheap form of sub-micron particles for doping. 0–10 wt% of the ash was added to Mg + 2B and in situ reacted at 850 °C for 30 min in flowing Ar atmosphere. The CaCO₃ decomposed and reacted with B to form CaB₆ as an impurity phase. Also, the T_c and the a-axis lattice parameter decreased with increasing ash content, which suggests that C substitution at boron sites occurred. Enhancement of high-field J_c(H), H_{irr}(T) and H_{c2}(T) was observed with an optimum level of about 5 wt% ash addition

Keyword: Paper ash, C and CaCO₃, superconductor