The superconducting properties of co-doped polycrystalline MgB2

ABSTRACT

In this study we compare the critical current density, the irreversibility line and the upper critical field of four MgB2 polycrystalline samples, which are either undoped or have 5% carbon or 5% carbon plus either 1% aluminium or 2% zirconium. We discuss how care must be taken for the extraction of the irreversibility line in such samples. We also show how ac susceptibility and Hall probe imaging can be used to examine whether the samples remain fully connected to the highest available fields. Compared to simple 5% carbon doping we find that co-doping provides modest improvement in the pinning properties at intermediate fields in the carbon plus zirconium doped sample.