

APP1-4

Substrate Temperature Dependence of AC Loss in BHO-doped SmBCO films

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REBCO have been studied to be applied to rotating machines for airplanes, generators, and so on^[1]. For these applications, it is necessary to improve their transport properties and reduce their AC losses. There are various ways to reduce their AC losses such as a laser scribing^[2], a transposed parallel conductor^[3], and so on. We focused on a magnetic field dependence of critical current density J_c in low field. That was because the less J_c in the field below an operating field was, the less AC loss was. In this study, we fabricated REBCO films which were introduced impurities into and controlled them. In results, their AC losses decreased.

Pure and BHO-doped SmBCO films were fabricated on IBAD-MgO buffered metallic substrates by using the PLD method. The BHO content was 2.3vol.%. The substrate temperatures T_s were changed from 840°C to 880°C. Magnetic field dependence of J_c in the films was measured at 77 K and at fields of 0-9 T. Magnetic field amplitude dependence of AC losses in the films was estimated from the magnetic field dependence of J_c .

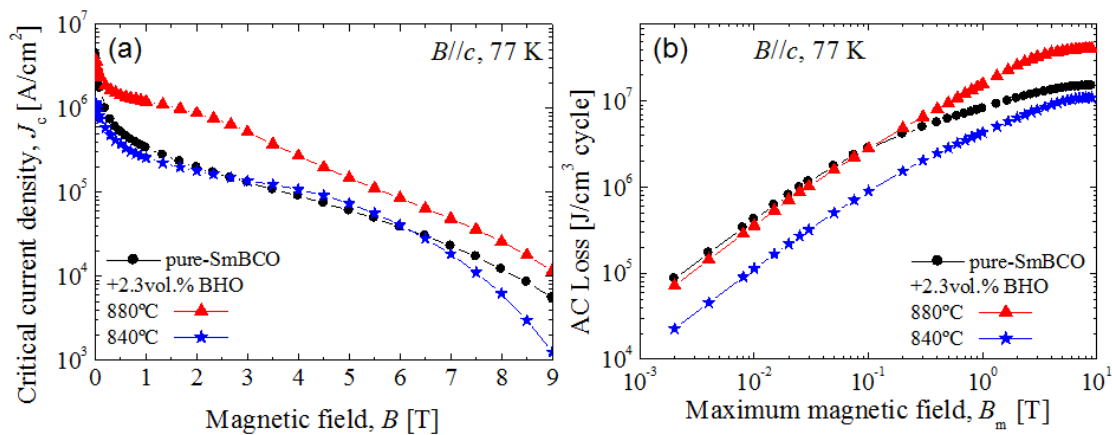
Figs.1(a) and (b) showed magnetic field dependence of J_c and magnetic field amplitude dependence of AC losses at 77 K and $B//c$ in pure and BHO-doped SmBCO films fabricated in various T_s . As a result, the AC loss in the BHO-doped film of $T_s = 880^\circ\text{C}$ was lower than one in the pure film in low fields, although the in-field J_c in the BHO-doped film was higher than one in the pure film. That was because that the J_c in self-field in the BHO-doped film was lower than one in the pure film. In addition, J_c in the BHO-doped film of $T_s = 840^\circ\text{C}$ was almost the same as one in the pure film but the AC loss in the BHO-doped film was lower than one in the pure film at fields of 0-9 T. In particular, the AC loss at 1 T was about half. We will discuss transport properties and AC losses in BHO-doped SmBCO films fabricated in lower T_s with various BHO contents.

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