

Effects of High Temperature Heat Treatment on the Microstructure and Superconducting Property of HTS Coated Conductor

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HTS coated conductor was heat treated at high temperatures below the melting points of silver and YBCO at different oxygen partial pressures. Current carrying capacity and microstructure were varied depending on the presence of silver protection layer. Critical current of coated conductor without silver protection layer was not changed when heat treatment was performed at 850°C for 2 hr in an oxygen atmosphere. However, coated conductor with silver protection layer revealed abrupt drop of I_c from 140A to 8A when heat treatment was performed at 800°C for 2 hr in an oxygen atmosphere. Coated conductor with silver protection layer retained 70~80 percent of its original I_c when heat treatment was performed at 800°C for 2 hr in an argon atmosphere containing 1000ppm oxygen. SEM and XRD observations showed that the reaction between YBCO and silver was occurred. The reaction between YBCO superconductor and silver was accelerated at high oxygen partial pressure. In oxygen atmosphere, it was found that silver film reacts with YBCO and destroyed the microstructure and superconducting property of YBCO film at the annealing temperature much lower than the melting points of silver and YBCO.

Keywords : superconductor, silver, coated conductor, YBCO, critical current