

Abstract Submitted
for the MAR15 Meeting of
The American Physical Society

Defects and critical current in REBCO films by ion irradiation

QIANG LI, TOSHINORI OZAKI, CHENG ZHANG, Brookhaven National Lab, BROOKHAVEN NATIONAL LAB TEAM — We will present our recent studies on the defects and critical current density (J_c) in superconducting $\text{ReBa}_2\text{Cu}_3\text{O}_7$ films (Re = Y, or rare earth element) irradiated by several types of ions at energy level between hundreds of KeV and tens of MeV. We observed remarkable enhancement of J_c in some of the irradiated films at low temperature and at high magnetic fields up to 35 T. We examined the ion irradiation induced defects by using advanced transmission electron microscopy. It was found that the ion irradiation at this kinetic energy range produces defects that are rather small (\sim a few nanometers) in physical size. However, these defects were found to create a substantially large strain field in the vicinity that depresses the pair potential and produce effective flux pinning at low temperatures. As the temperature approaching T_c , the irradiation induced pinning was found less effective, presumably due to the softening of vortex line. A correlation between the nano-structures of the defects and critical current will be discussed.

Qiang Li
Brookhaven National Lab

Date submitted: 13 Nov 2014

Electronic form version 1.4