

# Oxide Buffer Layers for $\text{YBa}_2\text{Cu}_3\text{O}_{7-\delta}$ Coated Conductors Using Cost-effective Electrodeposition Technique

**Lina Sang, Feng Fan, Minjuan Li, Shuang Cai, Yibing Zhang, Yuming Lu, Zhiyong Liu, Chuanyi Bai,  
Yanqun Guo, Qi Lu, Chuanbing Cai**

*Research Centre for Superconductors and Applied Technologies, Physics Department, Shanghai University, No.99, Shangda Road, China,  
200444*

*Email: sanglina@shu.edu.cn, cbc@shu.edu.cn Tel: +86-21-66132926*

Abstract: In the present work, the electrodeposition(ED) technique is realized as an effective, simple route to gain high quality buffer layer for YBCO coated conductor. The influences of water vapor and post-annealing conditions on biaxially texture and surface morphology for the films of  $\text{RE}_2\text{O}_3$  (RE=rare earth elements, Y, Ce) on the textured NiW tapes are studied. The  $\text{RE}_2\text{O}_3$  buffer layers exhibit high texture and low surface roughness, evidenced by phi-scan FWHM of 5-6° and RMS of 1.5-3 nm. Moreover, it is realized that a lower ambient pressure is applicable to reduce post-annealing temperature as well as the holding time. And, additional oxide buffer are prepared by magnetron sputtering deposition (MSD) to enhance the role of diffusion barrier, and then improve the superconducting performance. YBCO films are grown on MSD-CeO<sub>2</sub>/ED-CeO<sub>2</sub> exhibit a good  $J_c$  as high as 1.85 MA/cm<sup>2</sup> (77 K, self-field). Of more interests is that the crack-free CeO<sub>2</sub> film is obtained by electrodeposition. These results demonstrate that the electrodeposition technique is a very promising method for cost-effective scale preparation of oxide buffer layers.