



Contribution ID: 301

Type: Poster Presentation of 1h45m

Enhancement of crystallinity and critical current properties of fluorine-free MOD processed YBCO films by introduction of oxyhalide $\text{Ba}_2\text{Cu}_3\text{O}_{4-X}$ ($X = \text{Cl, Br}$)

Thursday, 31 August 2017 13:45 (1h 45m)

The fluorine-free metal organic decomposition (FF-MOD) is one of the most promising methods for preparing $\text{REBa}_2\text{Cu}_3\text{O}_y$ (REBCO, RE: rare earth elements) coated conductors because the simple chemical reaction to form textured REBCO phases is completed in a short time without any necessity of vacuum chambers or high power laser devices. However, reproducibility is not always high due to generation of misaligned grains inside the film. Therefore, coated conductors with long length have not yet been developed by FF-MOD method. Our recent study revealed that halogen-addition to the starting solution resulted in generation of oxyhalides, $\text{Ba}_2\text{Cu}_3\text{O}_{4-X}$ ($X = \text{Cl, Br}$), where only Cl and Br can be the candidate for X of $\text{Ba}_2\text{Cu}_3\text{O}_{4-X}$ composition. The $\text{Ba}_2\text{Cu}_3\text{O}_{4-X}$ crystal is a layered compound where $[\text{Cu}_3\text{O}_4]^{2-}$ layers and $[\text{Ba}_2\text{O}_2]^{2+}$ layers are alternately stacked. It should be noted that the size of Cu_3O_4 plane is almost same as that of CuO_2 plane in YBCO crystal. We have found that $\text{Ba}_2\text{Cu}_3\text{O}_{4-X}$ precipitates helped biaxial alignment of YBCO due to the perfect lattice matching, and hence highly textured YBCO films were obtained with high reproducibility by introduction of $\text{Ba}_2\text{Cu}_3\text{O}_{4-X}$. Also, co-doping of $\text{Ba}_2\text{Cu}_3\text{O}_{4-X}$ and impurity metal such as Hf and Zr is significantly effective to enhance flux pinning properties of FF-MOD processed YBCO films. Various interesting effects of oxyhalides on microstructures and superconducting properties will be discussed.

Submitters Country

Japan

Primary author: MOTOKI, Takanori (Aoyama-Gakuin Univ., JST-ALCA)

Co-authors: Mr IKEDA, Shuhei (Aoyama-Gakuin Univ.); Mr NAKAMURA, Shin-ichi (Aoyama-Gakuin Univ.); Mr HONDA, Genki (Sumitomo Electric Industries, Ltd.); Dr NAGAIISHI, Tatsuoki (Sumitomo Electric Industries, Ltd.); Prof. DOI, Toshiya (Kyoto Univ., JST-ALCA); SHIMOYAMA, Jun-ichi (Aoyama Gakuin Univ., JST-ALCA)

Presenter: MOTOKI, Takanori (Aoyama-Gakuin Univ., JST-ALCA)

Session Classification: Thu-Af-Po4.08

Track Classification: F4 - ReBCO Wires and Cables