

## Fluorine-free MOD Solution for High $J_c$ REBCO Superconducting Films

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Fluorine-free new MOD solution was developed for high  $J_c$  REBCO superconducting films. Various organic acid were used in order to prepare fluorine-free MOD solution. Diluted fluorine-free metalorganic precursor solution in methanol was coated on  $\text{LaAlO}_3(001)$  substrate by dip coating method. Processing parameters such as oxygen partial pressure, water vapor, ramping rate and pyrolysis temperature etc were controlled in order to obtain a good epitaxial film with a high  $J_c$ . 0.5 micron-thick film was obtained by single coating and no crack was present at calcined films. Oxygen partial pressure was varied in the range of 100-1,000 ppm and conversion heat treatment was carried out at the temperature range of 725-765 $^{\circ}\text{C}$ . A critical transition temperature ( $T_c$ ) of 90 K and a critical transport current density ( $J_c$ ) of  $> 0.5 \text{ MA/cm}^2$  (77 K and self-field) were obtained for the GdBCO film grown on LAO single crystal substrate with a thickness of 0.5 micron.  $I_c$  was determined by utilizing a transport measurement. SEM observations showed that the growth behavior of Y123 grains is different from that of TFA-MOD process and porous film was formed. It is thought that fluorine-free new MOD solution is promising for high quality REBCO films.

keywords : Fluorine-free, TFA-MOD,  $J_c$ , YBCO

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