

## A Method to Fabricate Biaxially Textured MgO Buffer Layer for HTS Coated Conductor

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**Abstract** — In this study, a radio frequency magnetron sputtering system without any assisting ion source was employed to fabricate biaxially textured MgO films on the substrates of amorphous  $Y_2O_3/Al_2O_3/Hastelloy$  stacks. During the deposition process, the growing MgO film could be bombarded by off-normal energetic particle flux mainly composed of oxygen atoms and negative oxygen ions, which originated from the target surface. MgO could obtain biaxial texture due to such bombardment, thus this method was named as energetic particle self-assist deposition (EPSAD). The texture of EPSAD-MgO films was evaluated by XRD measurement of the post-deposited homoepitaxial MgO layers. An out-of-plane orientation of MgO (111) and a 3-fold symmetric in-plane alignment were found. The MgO texture was optimal when the EPSAD-MgO thickness was about 10 nm. The establishment of biaxial texture during EPSAD process was verified by a control study, the influence of target inclined angle and target-substrate distance was also investigated. Compared with inclined substrate deposition (ISD) and ion beam assisted deposition (IBAD), the mechanism of EPSAD-MgO method was discussed. This study proposed a new method to fabricate biaxially textured MgO buffer layer for coated conductors, more optimization research will be conducted in our future study.

**Keywords (Index Terms)** — MgO film, biaxial texture, in-plane orientation, magnetron sputtering.