Chemical solution deposition (CSD) method is a promising method for production of 2G superconducting wire, allowing simple buffer layer architecture to be cost effective. With much effort by academic and industrial worlds, characteristic of 2G wire has been improved significantly. However, a fabrication process of buffer layer still has point of improvement and thus CSD method was attempted to simplify the buffer layer process with a planarization of unpolished tape. Multiple chemical solution, Y$_2$O$_3$-ZrO$_2$, was used for solution deposition planarization (SDP) and the RMS roughness of the buffer layer was achieved around 1 nm. This result stands comparison with the RMS roughness of the buffer layer by sputtering on electro-polished substrate. X-ray analysis results of Y$_2$O$_3$-ZrO$_2$ barrier layer indicate that LMO/MgO/Y$_2$O$_3$-ZrO$_2$ buffer film has good out-of-plane and in-plane textures with full-width-half-maximum values of 3.5° and 6~7°, respectively.

Superconducting wire fabricated by RCE-DR exhibits outstanding transport properties such as a critical current of 794 A/12 mm-width at 77 K in self-field. However, as to applying to any superconducting applications operating under high magnetic field, 2G wire by RCE-DR is not yet adequate for its low critical current under magnetic field and therefore pinning centers are indispensable. CSD can also provide a way to generate pinning centers in superconducting layer and to improve magnetic characteristics of 2G wire. In our study, through the insertion of extremely thin film with pinning centers between superconducting layer and buffered substrate (LaMnO$_3$/MgO/Y$_2$O$_3$/Al$_2$O$_3$/SUS) by CSD, artificial pinning centers (APCs) were obtained in the form of nanodot or second phase during RCE-DR process. More details will be presented at the conference.

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