

Scale up of Coated Conductor Substrate Process by Reel-to-reel Planarization of Amorphous Oxide Layers

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Abstract - Substrate surface smoothness comparable to electropolished substrate has been demonstrated by planarization of multilayers of amorphous oxide films on as received flexible metal tapes. An in-plane texture of 6.4 degrees was achieved on short samples after the final buffer process. A critical current density (J_c) over $3\text{MA}/\text{cm}^2$ has been achieved on short samples. The planarization process has been scaled up from a few meters previously done by loop coating to be capable of producing 100 meters. 20m of planarized substrate were processed with standard buffer deposition process and metal organic chemical vapor deposition (MOCVD) manufacturing run. An in-plane texture of eight to nine degrees was obtained on the entire 20m piece after the final buffer LMO process. A uniform critical current (I_c) of 160A was achieved on 15m. The planarization process has the potential to lead to a reduction in buffer layers and alleviate the burden of hazardous waste generated from the electropolishing process. It is capable of for planarization of any substrate alloy, while electropolishing is limited to only a few alloys.

Index Terms - Epitaxial growth, planarization, Superconducting epitaxial layers, Surface treatment, polishing

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