Pulsed Electron Deposition –A Novel Thin Film Deposition Technique for High Temperature Superconducting Thin Films

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Pulsed Laser Deposition (PLD), in last 10 years, has become the most preferred R&D method for depositing multi- component metal- oxide thin films such as HTS films. However, high cost of the technique has impeded its large- scale commercialization.

Pulsed Electron Deposition (PED) is a new thin film deposition technique currently commercialized by Neocera. A powerful, 100 ns pulse width electron beam generated in a specially designed source facilitates stoichiometric film deposition of multi-component metal-oxides. This technique is scalable and cost effective and could become the preferred manufacturing technique for complex materials. Epitaxial HTS thin films deposited by this technique have shown excellent superconducting properties with transition temperatures around 90 K and critical current densities (J-c) of 1.1 x 10^6 A/cm^2 at 77K. Preliminary data obtained on HTS films deposited on rolling assisted biaxially textured substrates have shown J-c of 0.3 x 10^6 A/cm^2 indicating the potential of PED for manufacturing long lengths of HTS coated conductors. This talk will address the PED technology, its scalability, and advantages over PLD in high volume manufacturing applications.

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