

## STRATEGIC RESEARCH AT ORNL FOR THE DEVELOPMENT OF ADVANCED COATED CONDUCTORS: PART - II

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### ABSTRACT

In an effort to develop alternative single buffer layer technology for  $\text{YBa}_2\text{Cu}_3\text{O}_{7-8}$  (YBCO) coated conductors, we have investigated both  $\text{LaMnO}_3$  (LMO) and  $\text{La}_2\text{Zr}_2\text{O}_7$  (LZO) as potential buffer layers. High-quality LMO films were grown directly on textured Ni and Ni-W (3%) substrates using rf magnetron sputtering. Highly textured LZO buffers were grown on textured Ni substrates using sol-gel alkoxide processing route. YBCO films were then grown on both LMO and LZO buffers using pulsed laser deposition. Detailed X-ray studies have shown that YBCO films were grown on both LMO and LZO layers with a single epitaxial orientation. A high  $J_c$  of over  $1 \text{ MA/cm}^2$  at 77 K and self-field was obtained on YBCO films grown on both LMO-buffered Ni or Ni-W substrates, and also on LZO-buffered Ni substrates. We have identified  $\text{LaMnO}_3$  as a good diffusion barrier layer for Ni and it also provides a good template for growing high current density YBCO films. Similarly we have also demonstrated the growth of high  $J_c$  YBCO films on all solution buffers. We will discuss in detail about our buffer deposition processes.