

# Advances in Pulsed Electron Deposition Reel-to-Reel demonstrations

(Courtesy of Dr. Hans Christen, Oak Ridge National Laboratory)



Under a DOE program, a Neocera Pulsed Electron Deposition (PED) source has been integrated with a reel-to-reel system designed and developed by Dr. Hans Christen of ORNL. Excellent materials quality has been demonstrated at ORNL in meter long high temperature superconducting (HTS) tapes. A critical milestone - an electric current density of  $1.6\text{MA}/\text{cm}^2$  at  $77\text{K}$ , has been achieved in a sample of YBCO using ORNL's patented substrate.

This demonstration marks the very first HTS tape production by PED in a reel-to-reel configuration.

**N**eocera added Pulsed Electron Deposition (PED) to their product line in 2001 as a cost effective alternative to Pulsed Laser Deposition (PLD) in high volume manufacturing of complex functional oxides. Manufacturing of second generation coated conductors for example, is estimated to be four-times more cost effective relative to PLD.

Over the last 3 years, Neocera improved the performance of the pulsed electron source and has successfully commercialized PED products (sources and systems) in a variety R&D environments. Currently, PED technology is used by about 15 groups world-wide for depositing high temperatures superconductors (HTS), ferroelectric and magnetoresistive films, thermal barrier coatings, intermetallic films, hard coatings, transparent conducting oxides (TCO) and polymers.



At ORNL, a 1-cm wide sample of the substrate, coated with 1.3 microns thick YBCO carried 159 Amperes of current at 77K. This rapid progress made at ORNL in a short turn around time is a significant indicator of the potential of PED for large scale applications. For more details [christenhm@ornl.gov](mailto:christenhm@ornl.gov) or [harsh@neocera.com](mailto:harsh@neocera.com)



#### **Contact Information**

Neocera, Inc  
10000 Virginia Manor Road  
Beltsville, MD 20705, USA  
Phone: 301-210-1010  
Fax: 301-210-1042  
E-mail: [sales@neocera.com](mailto:sales@neocera.com)