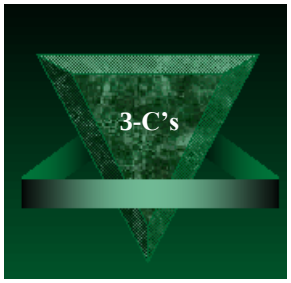
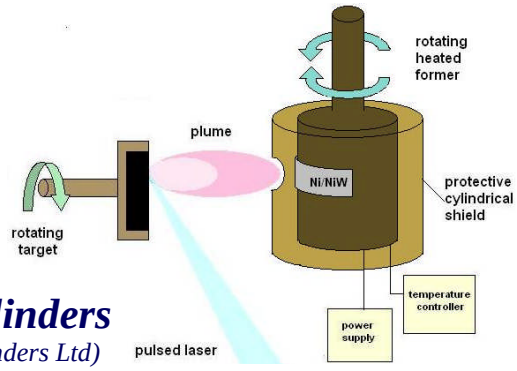


Coated Conductor Cylinders



Progress in Coated Conductor Cylinders

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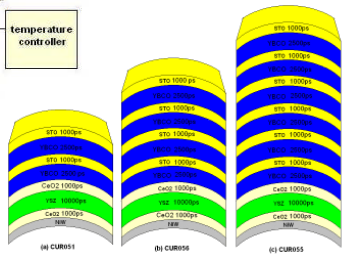
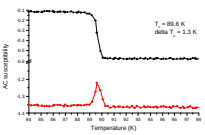
Y L Cheung, D Pavlopoulos and J S Abell (B'ham University), UK

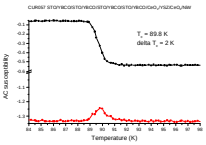
Abstract : For some years now we have been reporting[1,2] the development of an alternative approach to the fabrication of superconducting electrical machines based on coated conductor. Instead of winding CC tape into coils, as was the case for the READY (BRPR-CT98-676) transformer[3], for example, we are working on deposition of multilayer YBCO films directly onto rotating cylinders followed by lithographic techniques to pattern these films into coils.

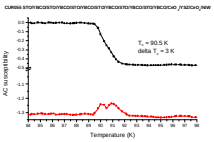
Here we present further systematic work on the feasibility of the multilayer scheme for two, four and six STO/YBCO layers on buffered curved Ni:W RABiTS, and also on the adaptation of the MgO ISD approach[4] for a textured seed layer onto rotating and translating cylinders.

The general principles look ever more promising, because of the ease of processing in this geometry, and the potential for much higher engineering current density than CC tape.









1. E. Maher, "Coated conductor cylinders – an alternative approach", International Workshop for Coated Conductors and Applications (CCA2003), September 11-13, 2003, Lago d'Orta (Milan), Italy.

2. E. Maher, J.S. Abell, R.I. Chakalova, Y.L. Cheung, T.W. Button, and P.Tixador, "Multi-layer coated conductor cylinders – an alternative approach to superconducting coil fabrication", Superconducting Science and Technology, vol 17, 2004, pp1440-1445.

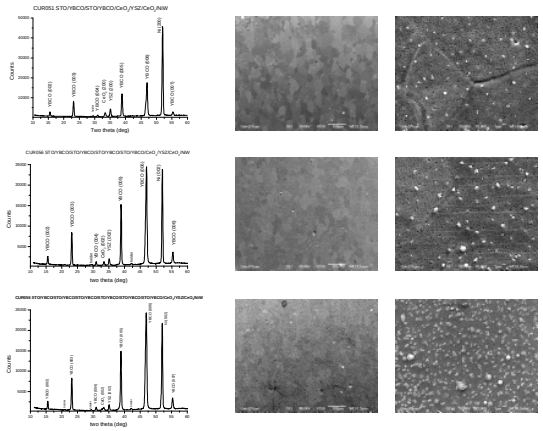
3. P. Tixador, G. Donnier-Valentin, T. Trollier, L. Michellier, E. Maher, A Usoskin. "First tests of a Bi/Y transformer", invited paper at EUCAS 2003, Inst. Phys. Conf. Ser. No 181, pp283-290.

4. W. Prusseit, C. Hoffman, R. Nemetschek, G. Sigel, J. Handke, A. Lumkemann. H. Kinder "Long length coated conductor fabrication by inclined substrate deposition and evaporation", Inst. Phys. Conf. Ser. No. 43 (2006), pp215-218.

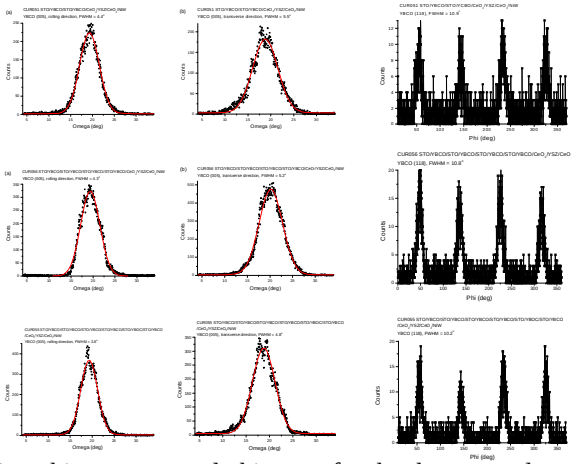
Sample	No. of YBCO layers	T_c(K)	ΔT_c(K)	Out-of-plane texture (deg)	In-plane texture
CUR051	2	89.6	1.3	4.4/5.5	10.9
CUR056	4	89.8	2	4.3/5.2	10.8
CUR057	6	90.5	3	3.8/4.8	10.2

[a]Transition width
[b]Out-of-plane texture is the FWHM of YBCO(005)
[c]In-plane texture is the average of the FWHMs from the YBCO(118) peaks

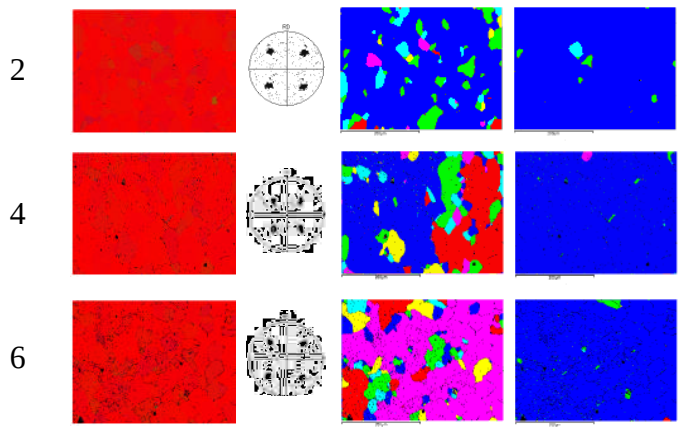
Transition properties and textures of multi-STO/YBCO layers on buffered curved NiW.



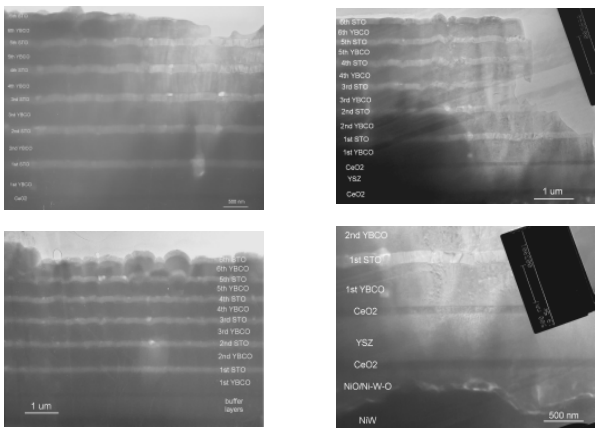
Theta- 2theta XRD data, and secondary electron images for the surfaces of the three samples.



XRD rocking curves and phi scans for the three samples



EBSD data, including pole figures and misorientation maps for two and six degree thresholds respectively.



Cross-sectional TEM micrographs for the six layer sample.