



Contribution ID: 1143

Type: **Invited Oral Presentation**

## M1Or3B-01 [Invited]: Transient liquid assisted growth: why is it a new opportunity for nanostructured coated conductors?

*Monday, July 22, 2019 4:00 PM (25 minutes)*

Coated conductors (CCs) of  $\text{YBa}_2\text{Cu}_3\text{O}_7$  (YBCO) have emerged as the most attractive opportunity to reach unique performances for large scale superconducting power applications and high field magnets, though reducing the cost/performance ratio continues to be a key objective at present. It is still particularly necessary to develop faster growth in order to increase the CC throughput. Liquid-assisted growth of YBCO coated conductors is a very promising approach to fulfill this requirement.

In this presentation a novel methodology of very general validity will be reported called Transient Liquid Assisted Growth (TLAG). We will show that using Chemical Solution Deposition (CSD) of non-Fluorine metalorganic precursors we can generate kinetic conditions where the thermodynamic hindrances to form stable liquids can be avoided and so a transient liquid can be formed in principle for any  $\text{REBa}_2\text{Cu}_3\text{O}_7$  (RE = Rare Earth or Y). We will show that growth rates as high as 100 nm/s can be achieved with this approach. On the other hand, an additional advantage of CSD-TLAG is that preformed nanoparticles can be incorporated to the metalorganic ink to prepare superconducting nanocomposites and so enhance vortex pinning. We will present the principles of this novel growth approach and the different strategies we are following to control supersaturation in the liquid assisted nucleation and growth, the new defects landscape and the role of the preformed nanoparticles in the vortex pinning of TLAG-nanocomposites. Finally, the potential of CSD-TLAG for industrial scaling up and specific power applications will be discussed.

This research has been funded by projects EU-ERC\_AdG-2014-669504ULTRASUPERTAPE, EU-FP7 NMP-LA-2012-280432 EUROTAPES, EU-H2020 FASTGRID and Excellence Program Severo Ochoa SEV2015-0496

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**Session Classification:** M1Or3B - Focus Series A: REBCO Coated Conductors III