# Materials Opportunities to Boost HTS-CC. Example of Transient liquid Assisted Growth

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***Abstract*** – **High Temperature Superconducting Coated Conductors (HTS-CC) have become a powerful material for high current - high temperature and high current - high magnetic field applications with a continuously increase from power applications and high field magnets to the new demands of electrical airplanes, accelerators, fusion reactors. Outstanding advances have been realized at the industry level in terms of improving performance, length, thinner substrates, process robustness, yield and reduction of fabrication costs. However, there are several materials aspects that could still be envisaged to boost their market penetration. We can further decrease the cost/performance ratio by developing fast growth, simpler processing and lower capital investment methods. At the same time, we should foster higher critical current CC by engineering the vortex pinning landscape for the specific needs of each application. Nanocomposites have been the most reliable method, but still the geometry, orientation, strained induced by nanorods/nanoparticles are not selectively chosen for each case. Another relevant aspect, scarcely tackled, is the capacity to modify the condensation energy of the different pinning centers by tuning the charge carrier density with oxygen doping. This is an excellent opportunity that HTS-CC have not explored. In this presentation, I will present our progress on the high-throughput Transient Liquid Assisted Growth (TLAG) method to grow HTS-CC at ultrafast growth rates (100-1000 nm/s) using low-cost chemical solution approaches [1]. Next, I will present the opportunities of engineering the pinning landscape of TLAG films and nanocomposites utilizing the opportunities given by extreme non-equilibrium conditions. Finally, I will expose our efforts in increasing the condensation energy by overdoping the HTS films [2], a robust and scalable approach to increase the critical currents of HTS-CC.**

[1] L. Soler et al, Nat Comm. 11, 344 (2020)
[2] A. Stangl et al, Sci. Reports 11, 8176 (2021)

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