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[Invited] Effectiveness of laser striation for AC loss reduction in SuperOx coated conductor.

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The physical properties of REBCO (RE=rare earth) high temperature superconductors require a flat tape architecture enabling them to carry high current densities. This architecture has an enormous ratio between the width and the thickness of the tape, typically ranging between 1,000 and 10,000. This very large aspect ratio has a detrimental effect on the AC losses, specifically the losses caused by the presence of an AC magnetic field perpendicular to the tape's flat face. Since the magnitude of the magnetization loss is proportional to the square of the tape's width, one obvious way to reduce it is by dividing the tape into narrow striations. This can be done either during the tape's manufacture process or successively on the end product. Different techniques have been successfully applied on tapes with just a thin Ag layer on top of the superconducting film. Unfortunately, most CC applications require tapes with Cu stabilization and an effective method to reliably achieve striation on Cu-stabilized tapes needs to be optimized. For this purpose, we used pico-second laser to produce samples with different numbers of filaments from 12 mm-wide tape manufactured by SuperOx. In order to produce Cu-stabilized samples with filaments, two different approaches were followed: 1) striation of Ag-stabilized coated conductor followed by electroplating; 2) striation of already Cu-stabilized coated conductor with different copper thicknesses. In this work the results of the different approaches will be shown and compared by means of microscopic analysis as well as of DC current and AC loss characterization. These results are expected to provide useful insight on the efficiency of this technique to produce application-ready low-loss coated conductors.

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