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Production of high temperature superconducting Thallium-based thin-film coatings

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The study of high-energy Future Circular Collider (FCC-hh) study includes investigation on thallium based high temperature superconducting materials to act as part of the beam screen for the circulating high energy proton beams stability. At present, the copper coating is used to keep the beam coupling impedance low, but at 50K it might not be sufficiently low. For beam stability, high- temperature superconductors have lower surface impedance than copper and Tl based superconducting thin film could be befitting this purpose among HTS-systems.

For this work, at CNR SPIN, several techniques are being employed that allow high-quality films to be grown on different substrates. We synthesis TBCCO superconducting thin films and pellets. For the deposition of the films electrodeposition, pulse laser deposition, and spin coating techniques are being used. Our recent work is directed at trying to improve the Tl-1223 phase in the thin films. And for this purpose, various techniques, compositions, and substrates are under study and a variety of substrate have been investigated for the growth of Tl-1223 film.

Primary author: SABA, Aisha (CNR-SPIN)

Presenter: SABA, Aisha (CNR-SPIN)

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