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## Current Flow Analysis of TI-1223 Superconductors by Scanning Hall Probe Microscopy and TEM Investigations

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The FCC-hh design study included investigations on various high temperature superconducting materials to act as part of the beam screen. A superconducting coating on the beam screen should improve cryogenic efficiency and beam impedance mitigation for a high beam stability margin. The extreme conditions in such a collider make high critical currents at high temperatures necessary. Our study focuses on the still technologically unexploited thallium-based cuprates. For the development of the coating, Tl-1223 pellets are prepared and Tl-1223 thin films are grown on various substrates. We present the microstructural analysis of these Tlbased superconductors performed with Scanning Electron Microscopy and Transmission Electron Microscopy where the chemical composition of the superconducting grains and especially the phase formation is demonstrated. Furthermore, we mapped the magnetic field above the sample surface by means of Scanning Hall Probe Microscopy. By comparing the local magnetization of the superconducting grains with microstructural features we determined the reasons for varying current flow in different parts of the superconductor.

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