

# Temperature Development in Superconducting Fault Current Limiters during Quenches

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We investigated temperature development in superconducting fault current limiters (SFCLs) during quenches. Knowledge on temperature development during quenches is important to the design of SFCLs, because temperature of SFCLs is related to their stability. SFCLs were fabricated by patterning Au/YBa<sub>2</sub>Cu<sub>3</sub>O<sub>7</sub> thin films grown on sapphire substrates into meander lines by photolithography. A gold film grown on the rear side of the substrate was patterned into a meander line, and used as a temperature sensor. The front meander line was subjected to simulated AC fault currents, and the rear line to DC current. They were immersed in liquid nitrogen during the experiment for effective cooling. Overall, temperature at the rear side of SFCLs was close to that at the front side. It was closer at the beginning of faults, and at lower applied voltages. Temperature distribution at the rear side was even except at the edge, as at the front side. These results tell that the whole SFCL was heated to similar degree during quenches, and that effective cooling of SFCLs at the rear side is important to the performance of SFCLs. The results could be explained quantitatively with the concept of heat transfer within the SFCL and to the surroundings.

keywords : quench, superconducting, fault current limiter, temperature

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