

Stability of Second Generation HTS Pancake Coils at 4.2K for High Heat Flux Applications

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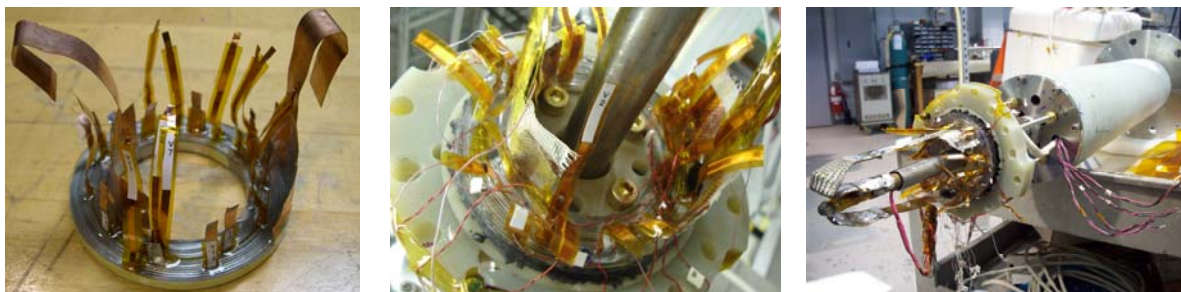


Figure 1(a): A small pancake coil using first length of 10 m of AMSC 344 superconductors, with current leads and voltage taps (wide and narrow Cu foils) and centrally located heater, one full turn, for stability testing in liquid He. 1(b) Instrumented coil on 1(c) a coil quench probe.

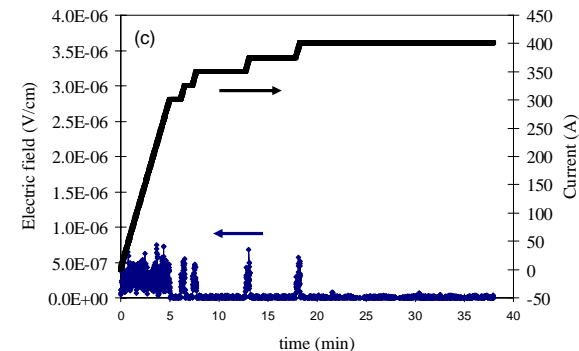


Figure 2: $E(t)$ and $I(t)$ for studying the coil stability during ramping and steady-state transport current at 400 A, at 4.2 K and a background field of 6 T.

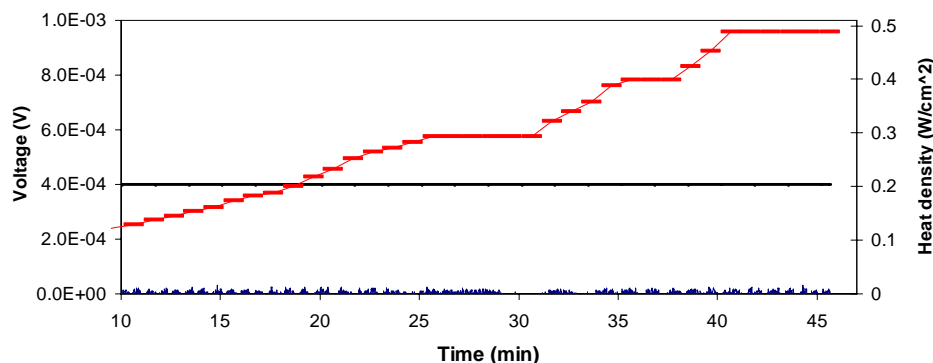


Figure 3: $V(t)$ and $heat(t)$ for studying coil stability with steady-state $I = 400$ A and a progressively increasing heat load.

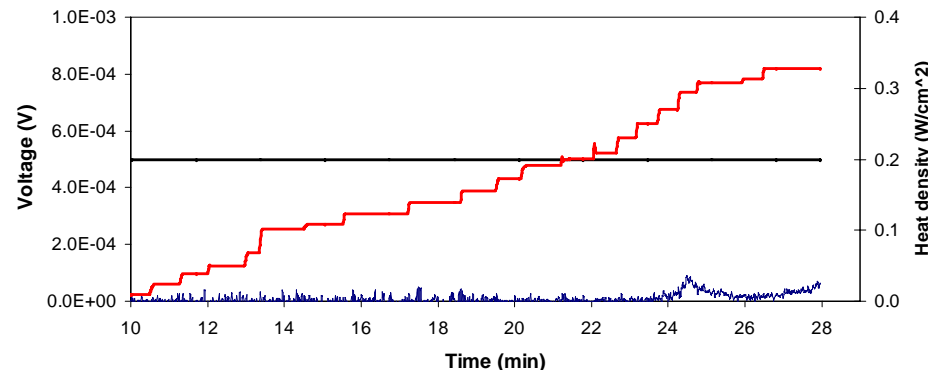


Figure 4: $V(t)$ and $heat(t)$ for studying coil stability with steady-state $I = 500$ A and a progressively increasing heat load. The first indication of quenching is seen at $heat = 0.294$ W/cm².

Interest in high temperature superconductors (HTS) arises from the anticipated large energy margin due to the high transition temperature and very high upper critical field of the HTS materials, which is much higher than that of Nb₃Sn. We tested a small pancake coil made with AMSC 344 wire which was provided with a centrally located heater. The coil could be run in a stable manner of transport current up to 500 A at 4.2 K and a background field of 6 T, against very high heat flux.

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