

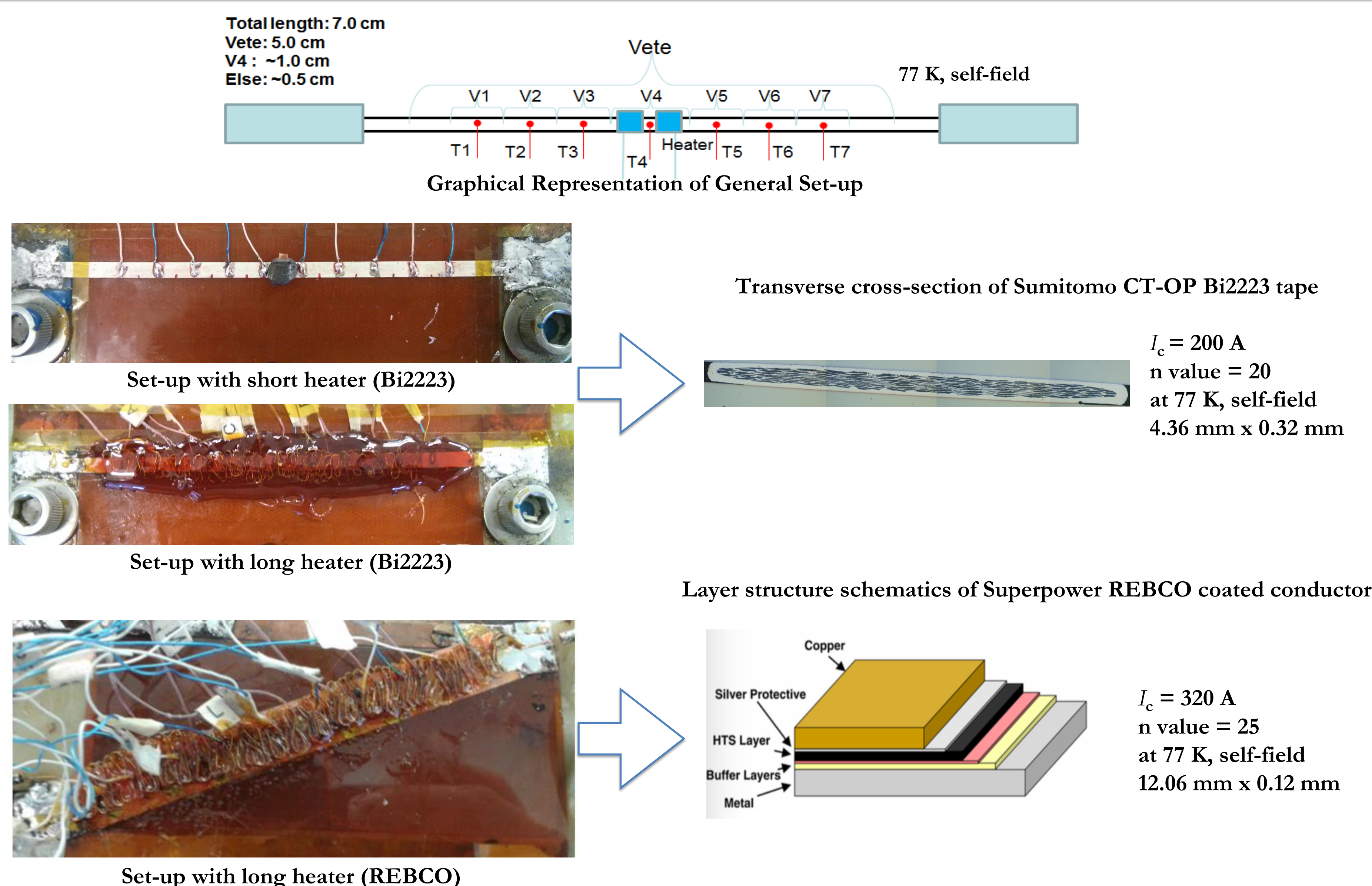
Quench induced critical current degradation in REBCO coated conductors and Bi2223 tapes

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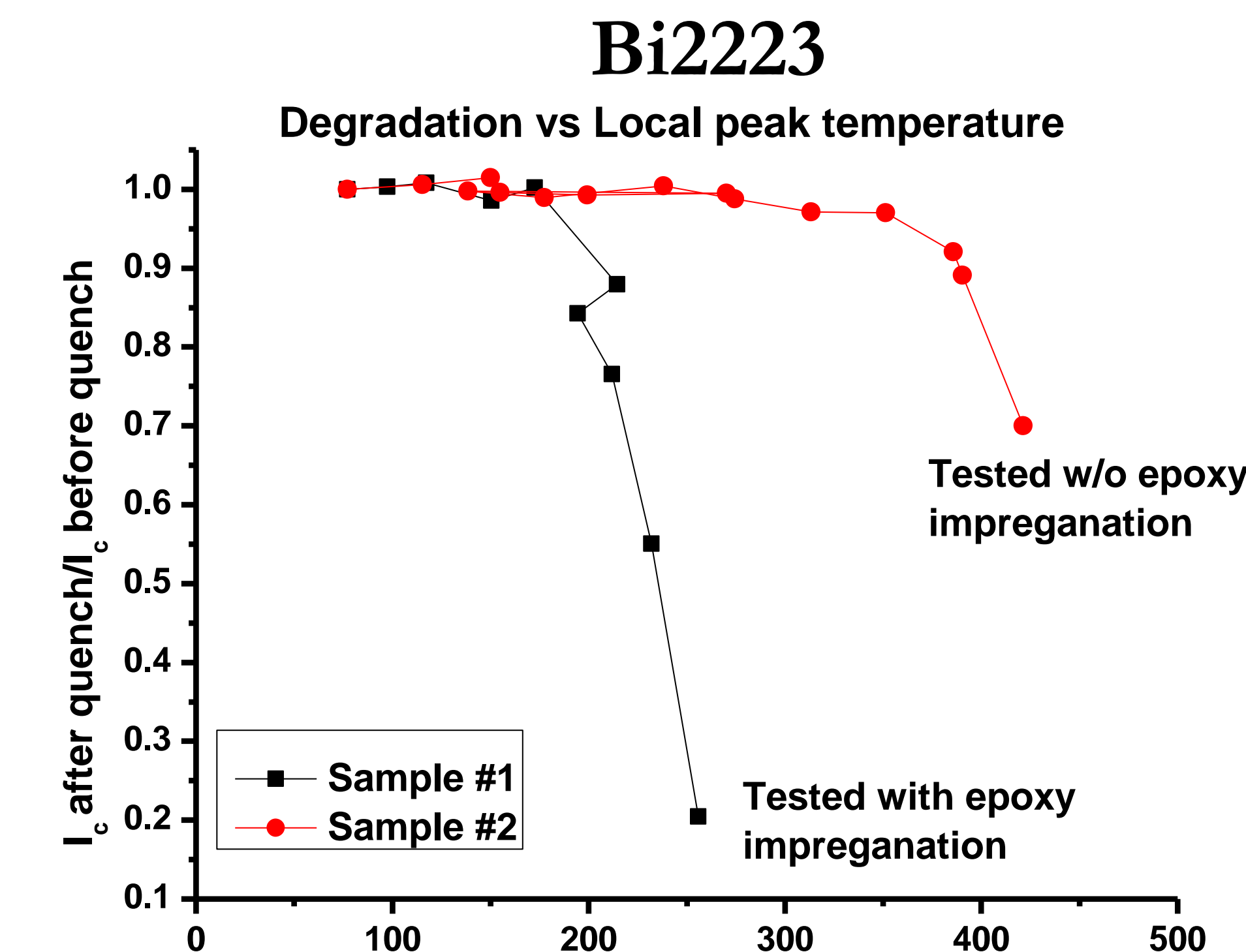
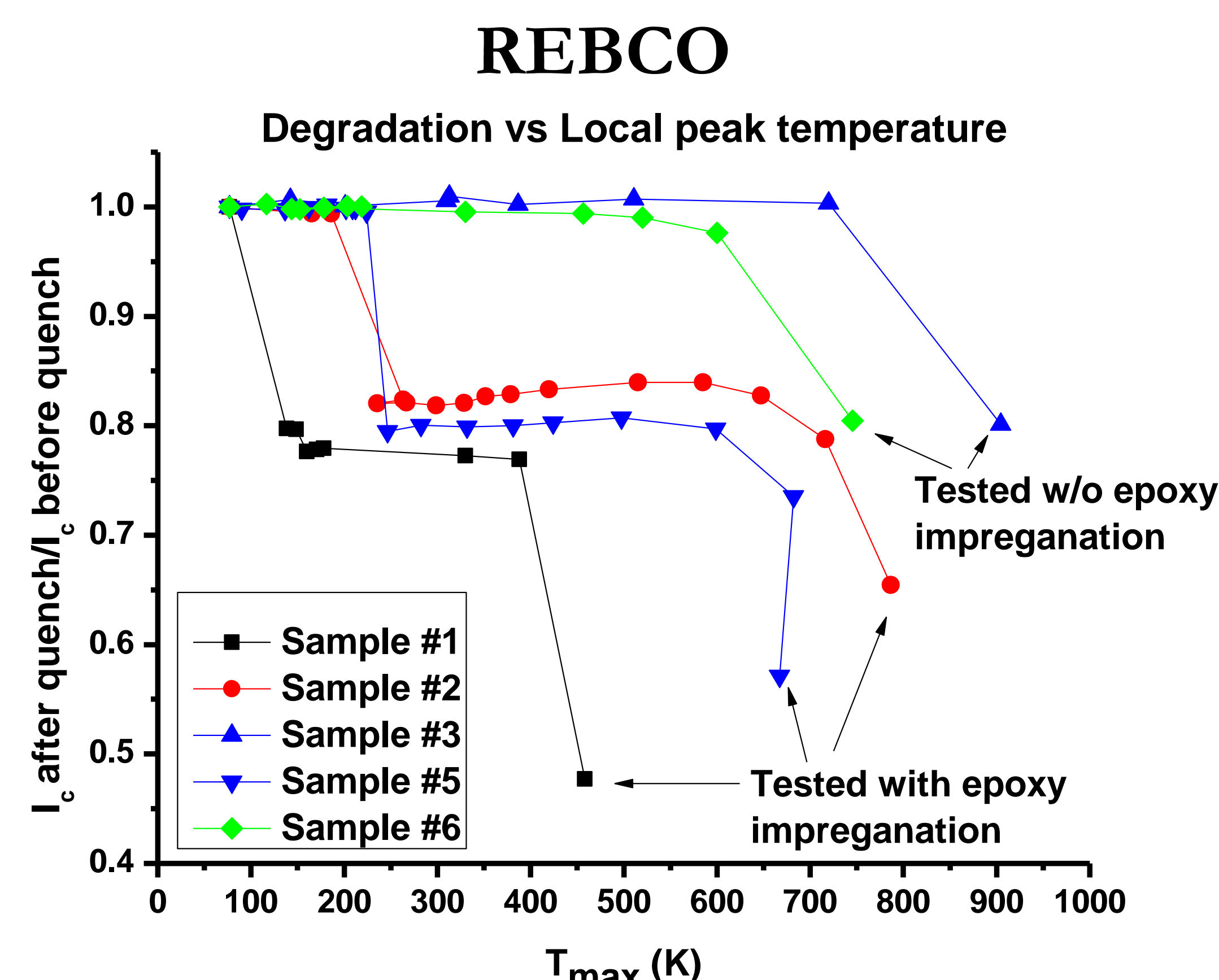
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- Understanding quench degradation behavior and limits of REBCO and Bi2223 conductors is important for developing high-field magnet technology from these high field conductors.
- Through extensive heater-induced quench experiments and microscopic observation of degraded samples, this work shows: (1) For both REBCO and Bi2223, quench degradation is very localized and strongly depends on T_{max} , the local hot spot temperature during a quench; (2) Standalone REBCO coated conductors showed irreversible degradation when T_{max} exceeded 700 K whereas when impregnated with epoxy, REBCO tapes exhibited degradation at T_{max} as low as 140 K; (3) Early investigation showed Bi2223 powder-in-tube tapes can degrade at a T_{max} of 200 K. (4) Microscopic observation showed delamination in the degraded REBCO coated conductors and other degradation features including holes punctuating the tape.

Experimental set-up for investigating quench degradation



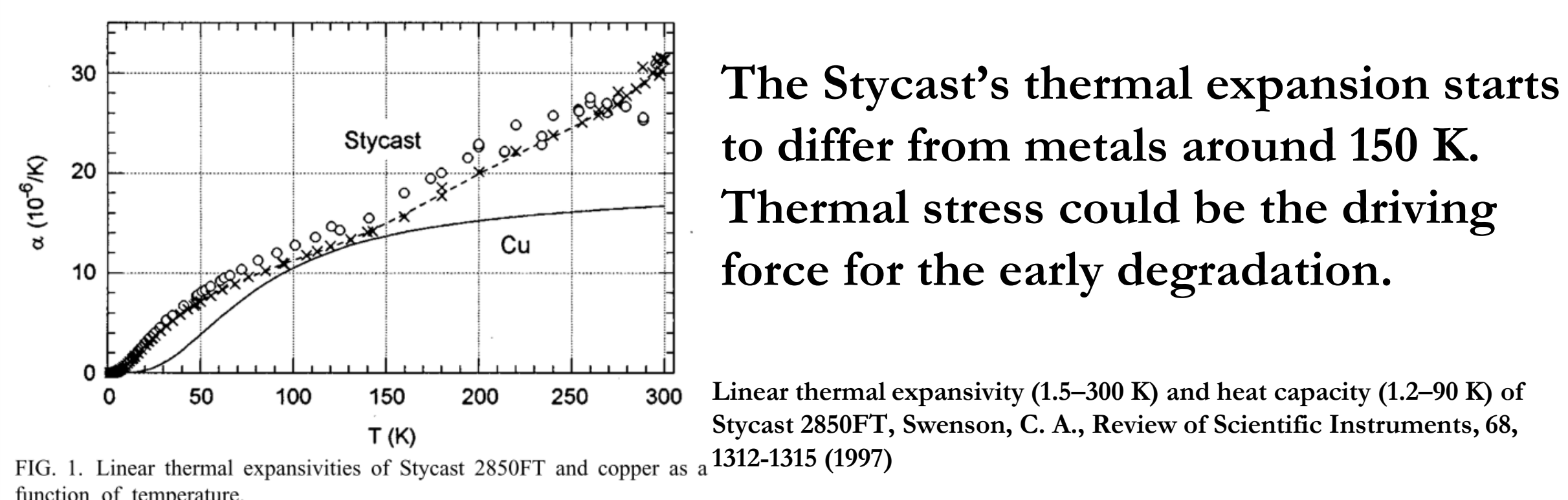
$I_{c_degraded}/I_{c_original} - T_{max_normal\ zone}$ behaviors observed among REBCO and Bi2223



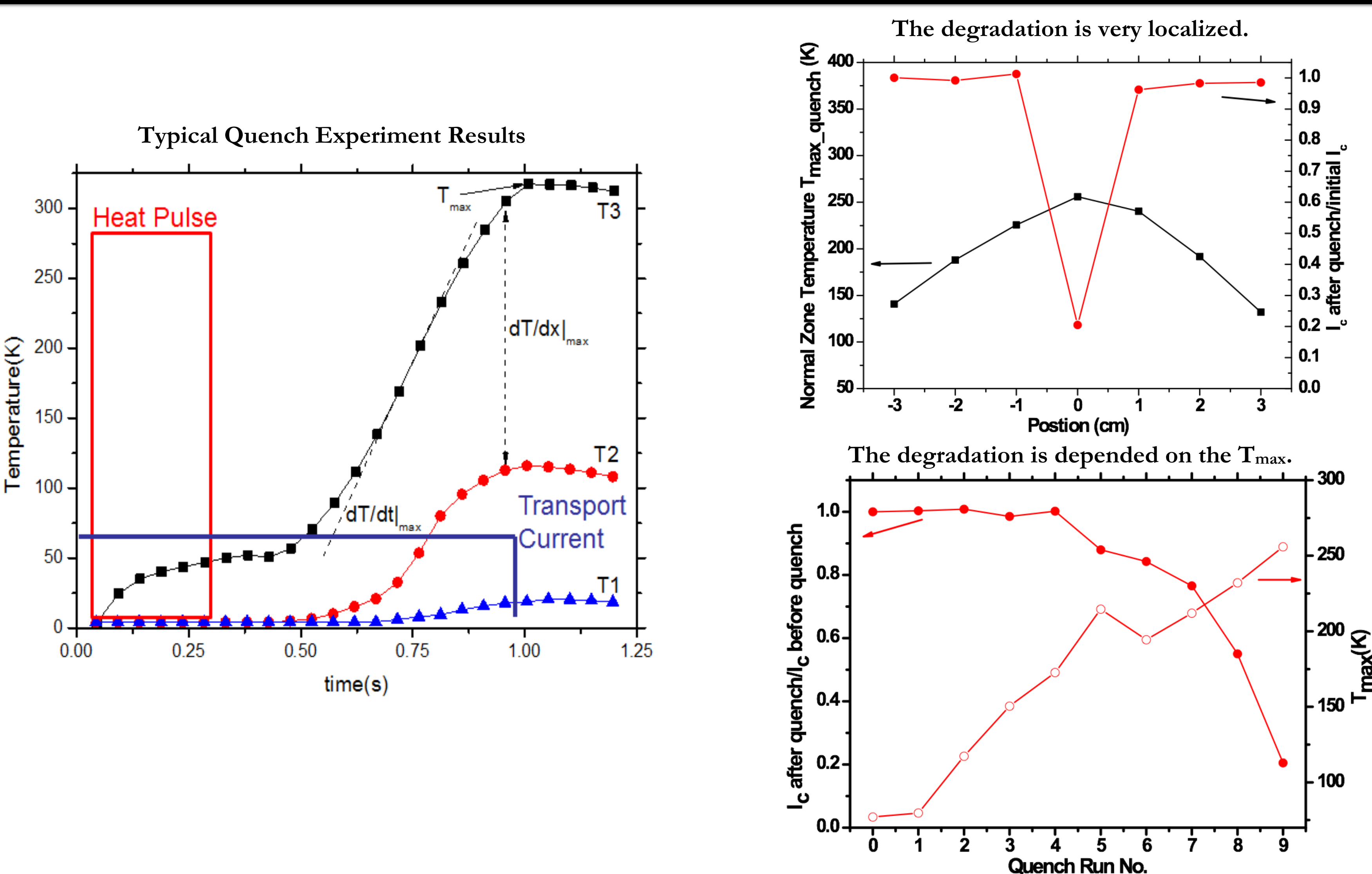
Sample	Heater	Epoxy	T of first damage
1	short	yes	200 K
2	long	no	400 K

- REBCO Conductors degraded irreversibly when T_{max} exceeded ~ 700 K.
- Epoxy (Stycast 2850) impregnated REBCO samples showed early degradation with T_{max} as low as 140 K.

Sample	Heater	Epoxy	T of first damage
1	short	yes	140 K
2	long	yes	280 K
3	long	no	850 K
4	flat	no	—
5	long	yes	270 K
6	long	no	750 K



Quench degradation is localized and strongly depends on hot spot temperature



Microstructure observation of the Degraded REBCO Samples

