

Performance of a new Bi-2212 wire with 37x18 architecture

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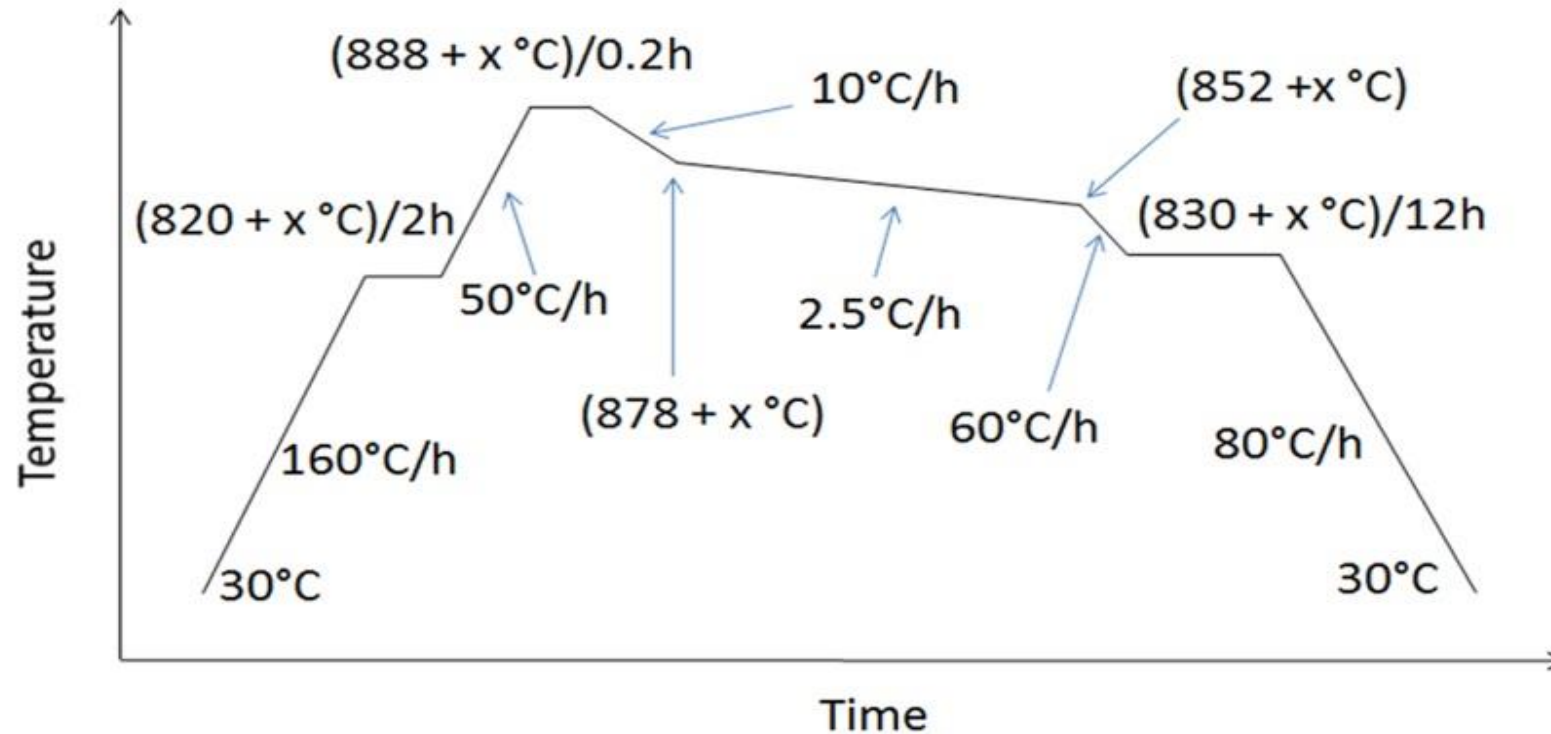
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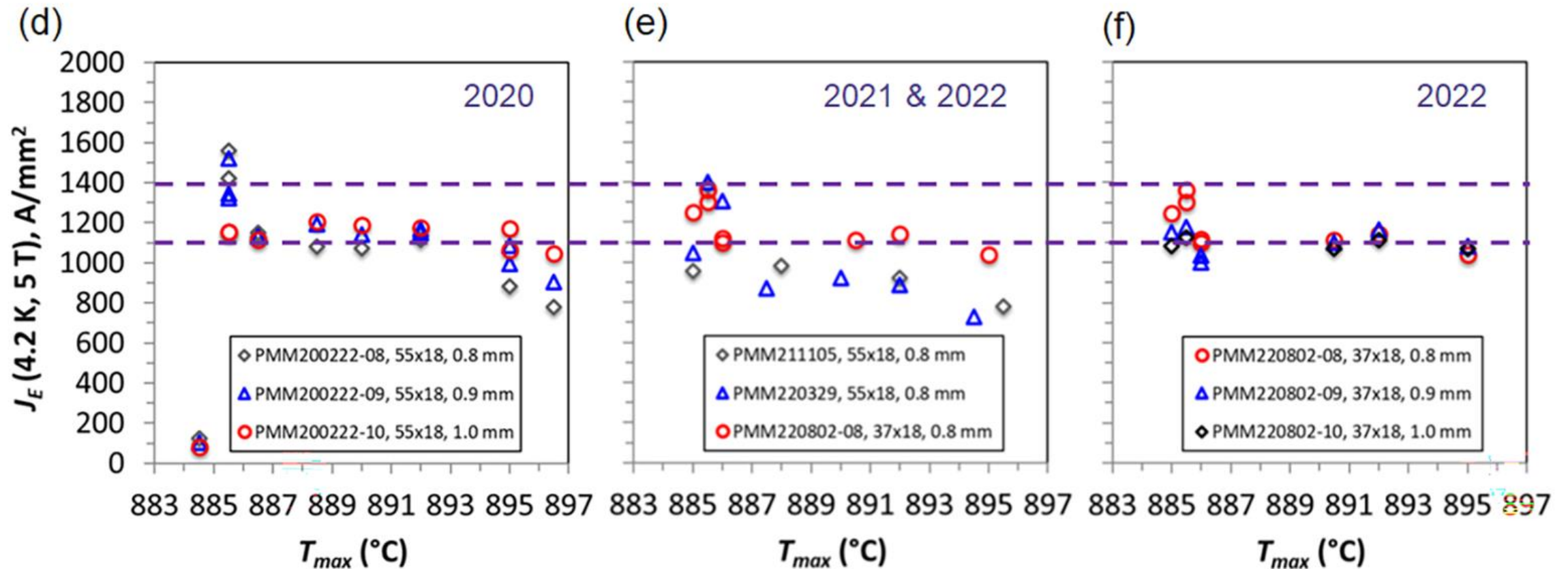


Standard 50 bar overpressure heat treatment



Jiang et al., *IEEE Trans. Appl. Supercond.* 31, 6400206 (2021)

J_E of recent Bi-2212 wires



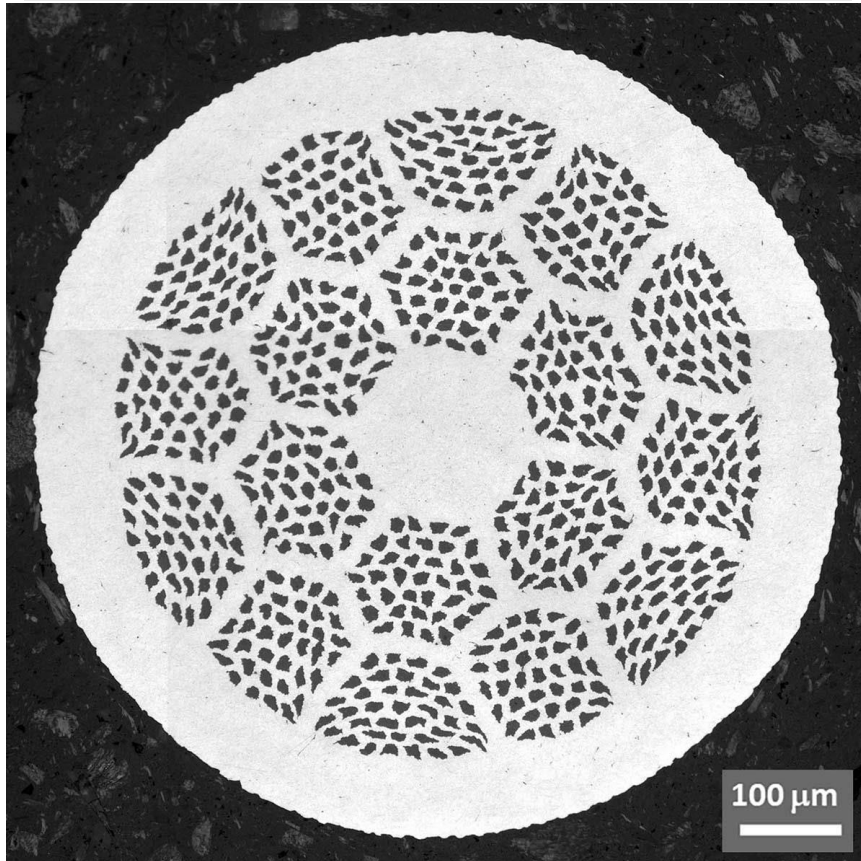
Jiang et al., *IEEE Trans. Appl. Supercond.* DOI: 10.1109/TASC.2023.3236870
<https://ieeexplore.ieee.org/document/10016674>

New billet PMM220802 (Engi-Mat SBIR Phase IIA)

- **Powder:**
 - Engi-Mat, LXD-96 (G2-13D)
- **Billet size:**
 - 2 kg
- **Architecture:**
 - 37x18
- **Wire diameter:**
 - 0.8, 0.9 and 1.0 mm

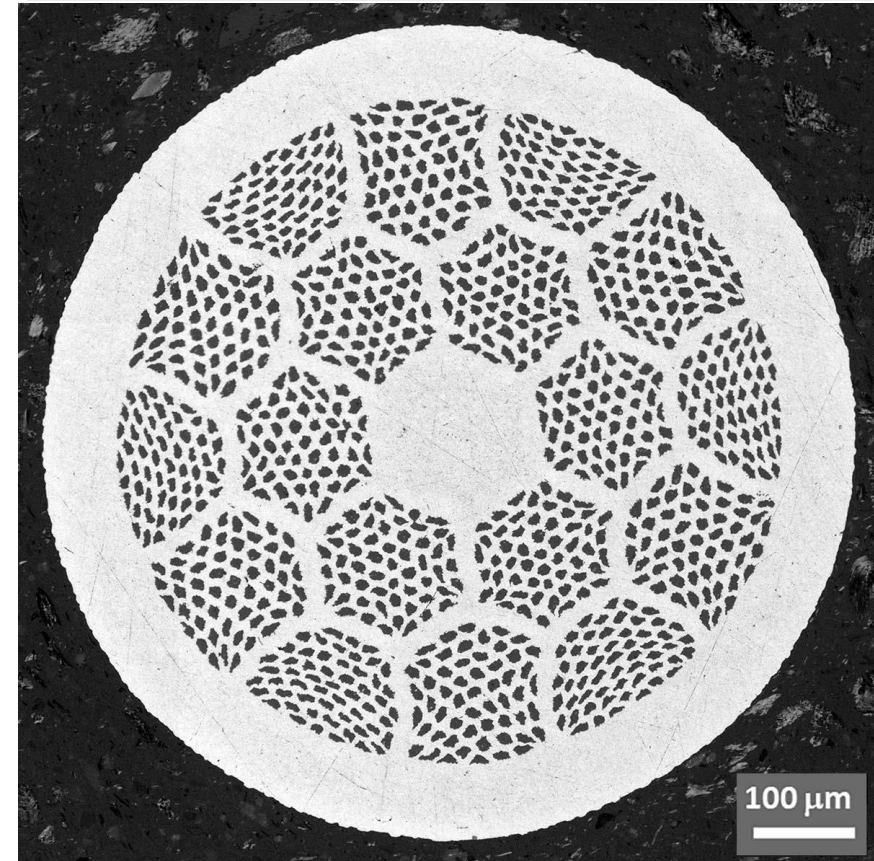
Wires after predensification (830°C/12 h/50 bar)

PMM220802 (37x18), 0.8 mm



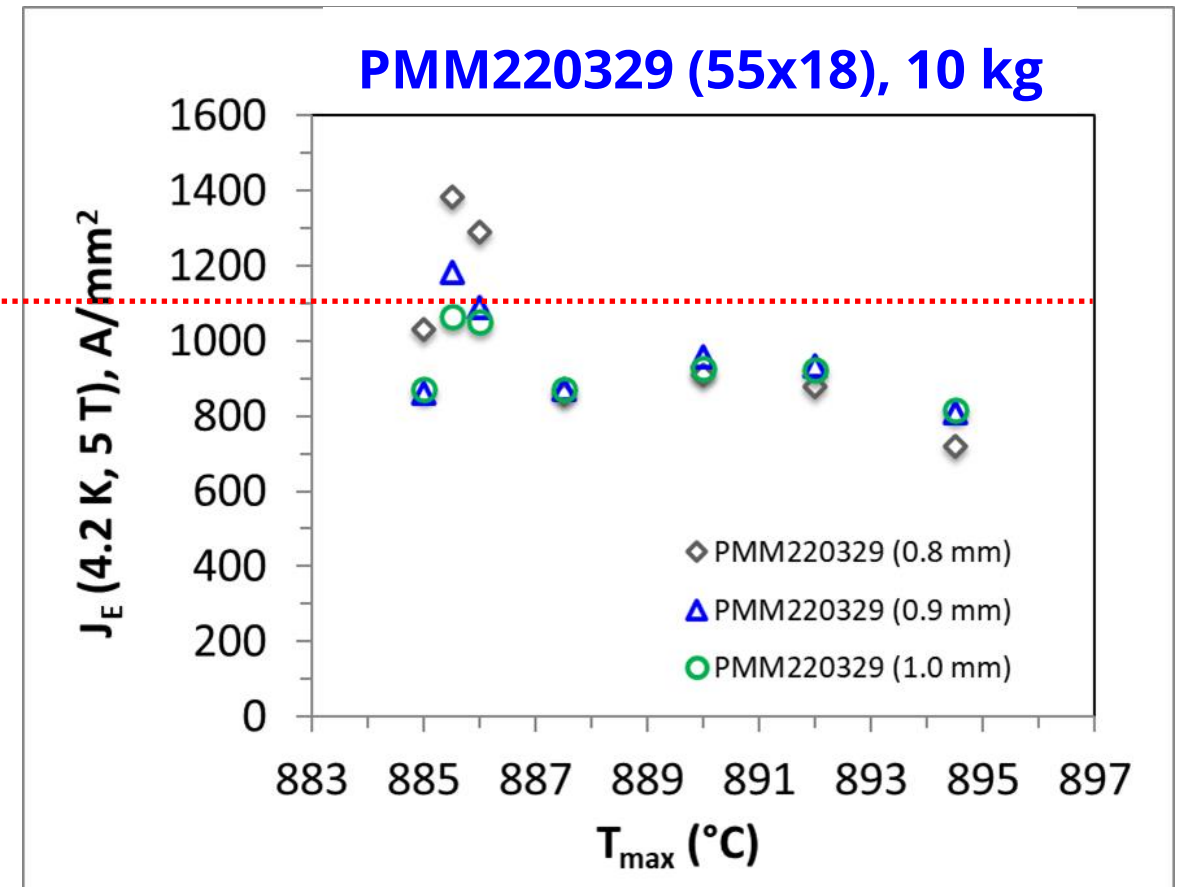
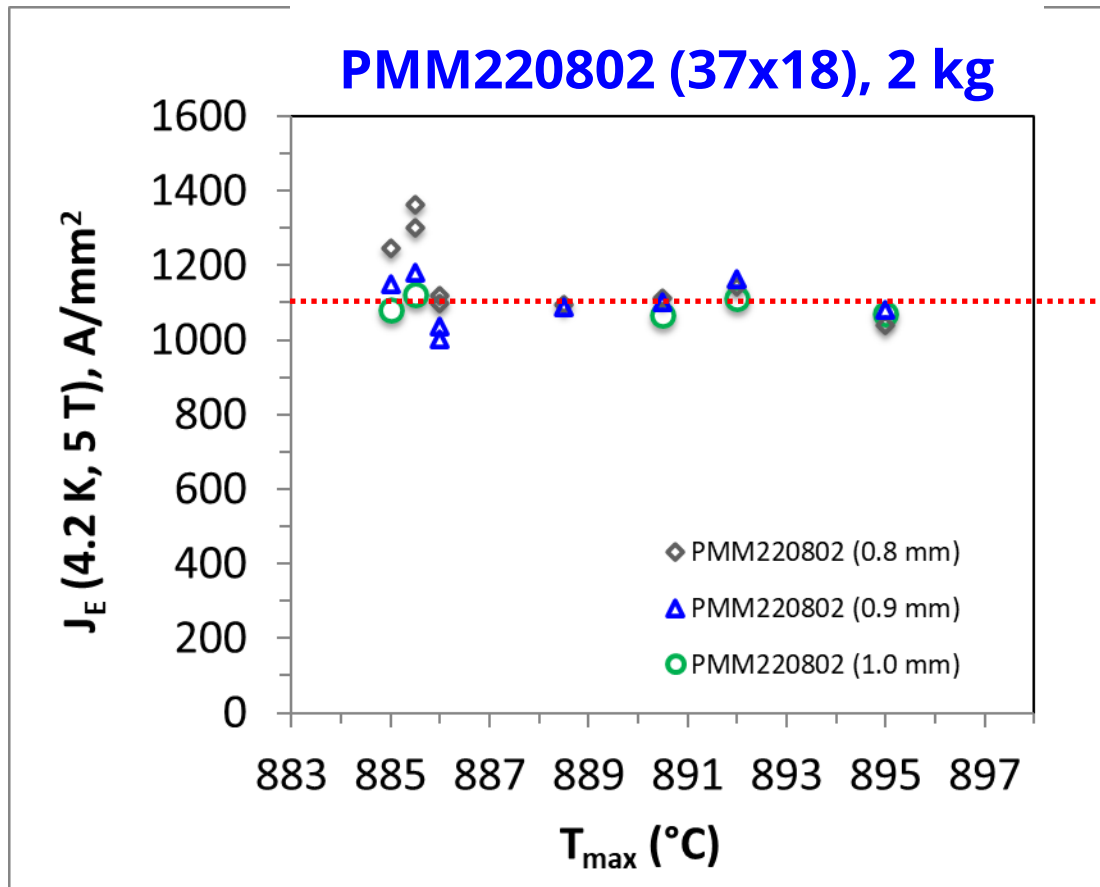
FF = 0.196, Filament size = 13.3 μm

PMM220329 (55x18), 0.8 mm



FF = 0.200, Filament size = 11.0 μm

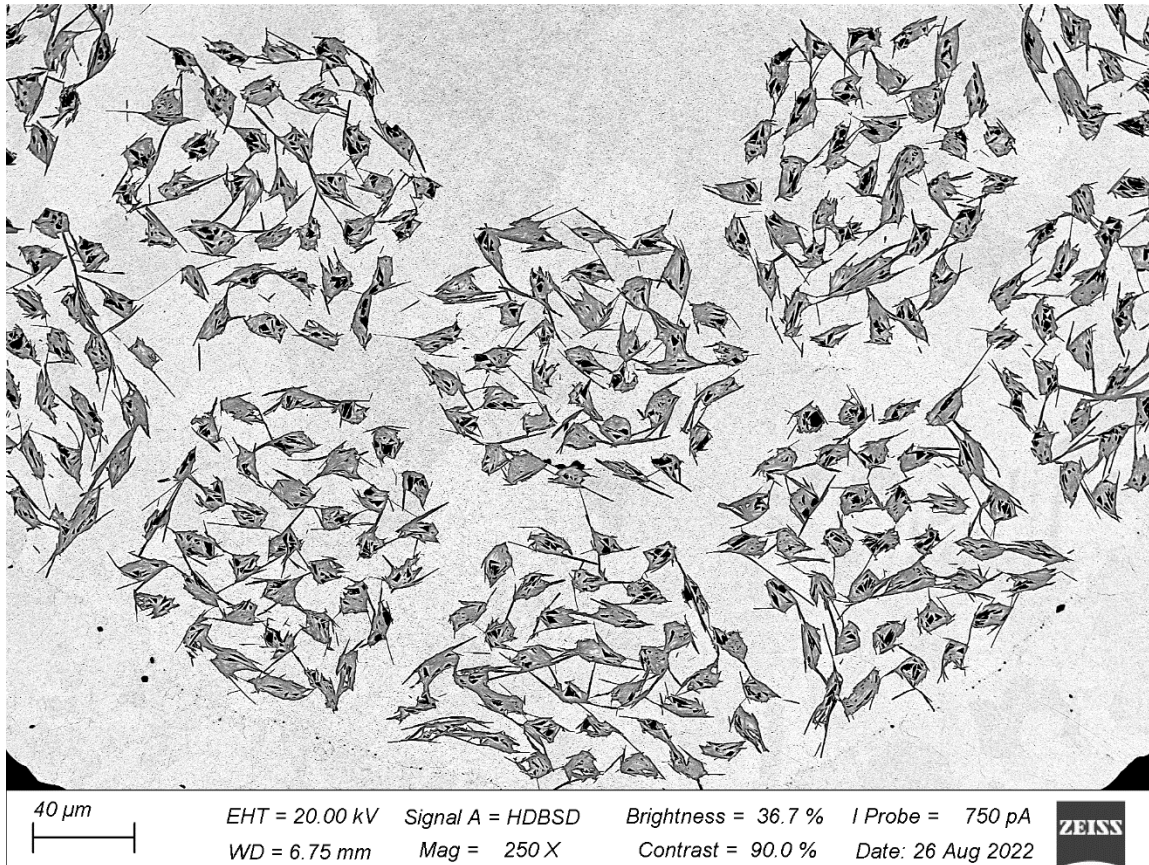
J_E (4.2K,5T) for PMM220802 (37x18) and PMM220329 (55x18)



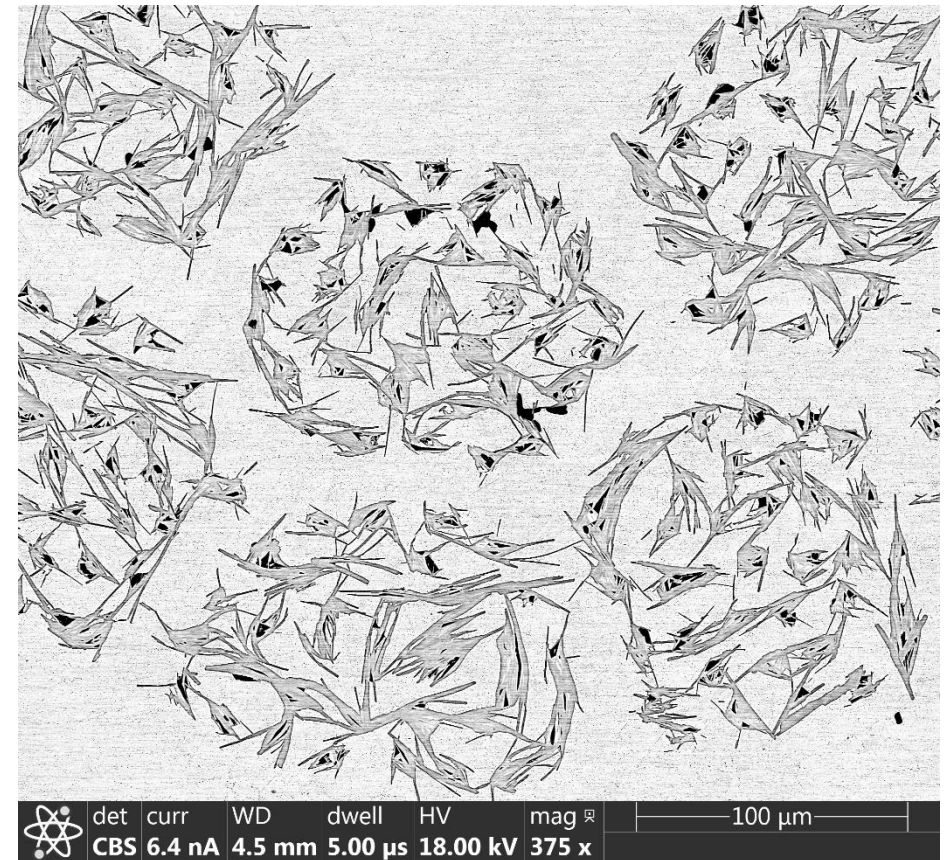
Wire PMM220802 shows a wider J_E plateau of 10 °C with J_E (4.2 K, 5 T) of ~ 1100 A/mm².

SEM images of 0.8 mm PMM220802 (37x18) after OP-HT

$T_{\max} = 885.5 \text{ }^{\circ}\text{C}$

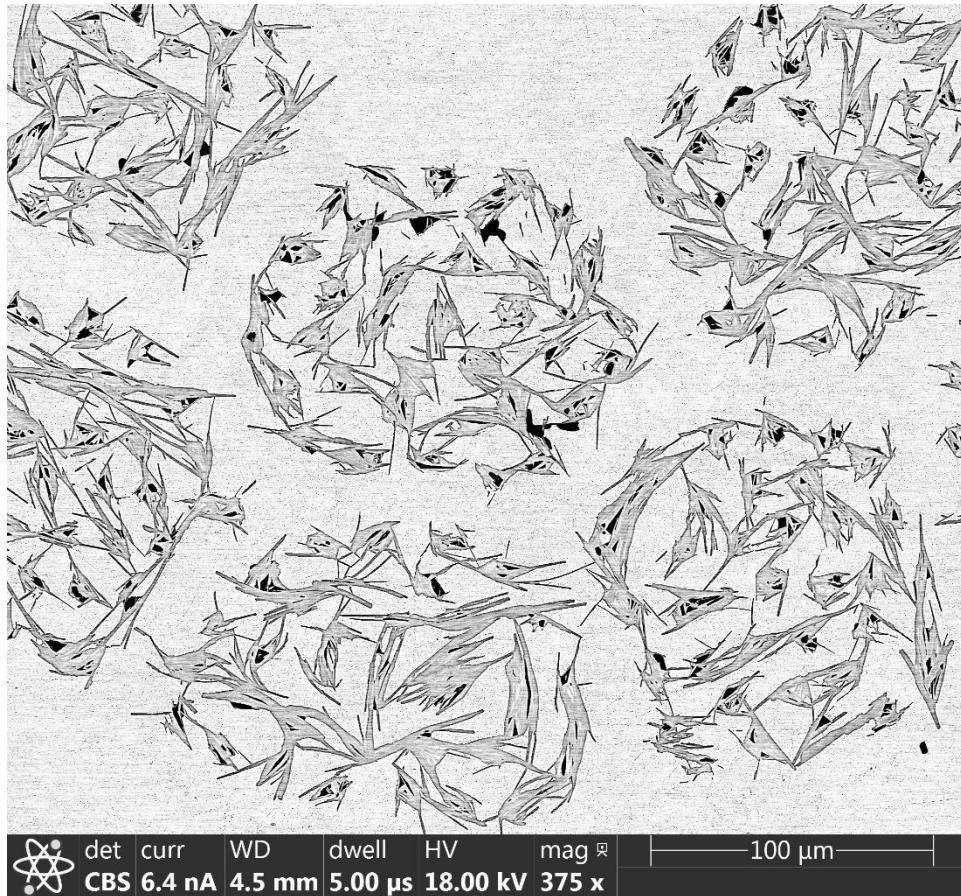


$T_{\max} = 895 \text{ }^{\circ}\text{C}$

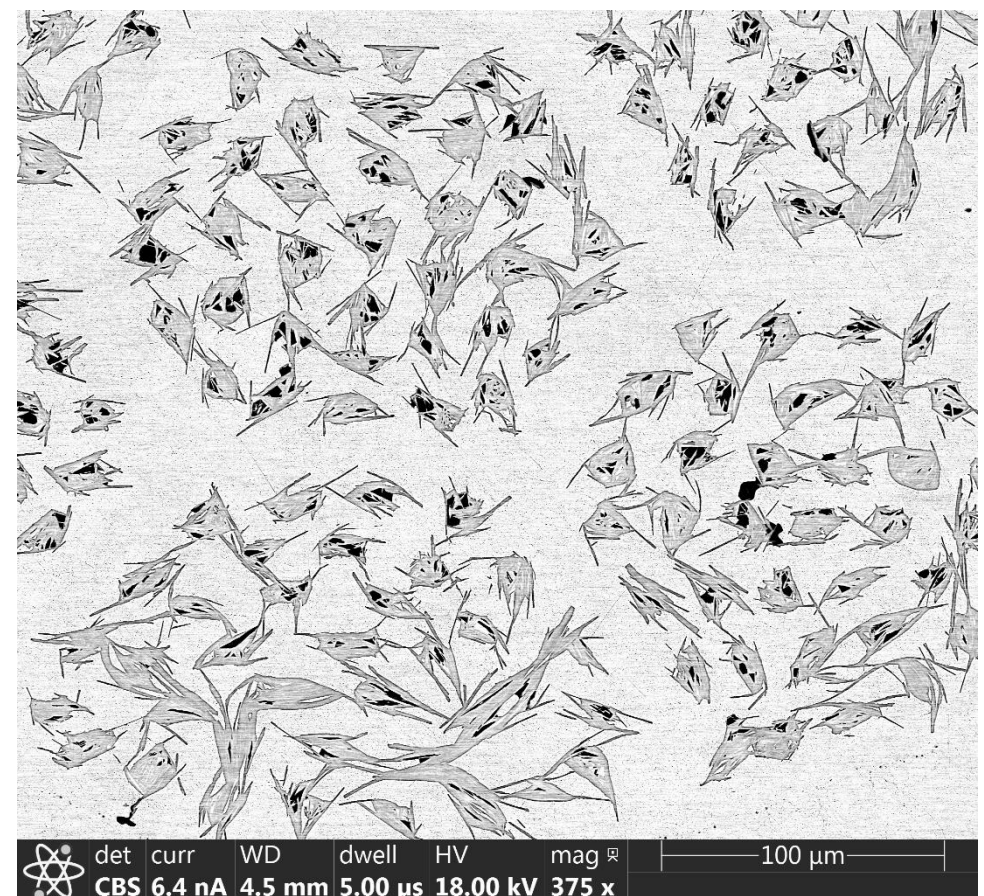


0.8 mm vs. 1.0 mm wire for PMM220802 with T_{\max} of 895 °C

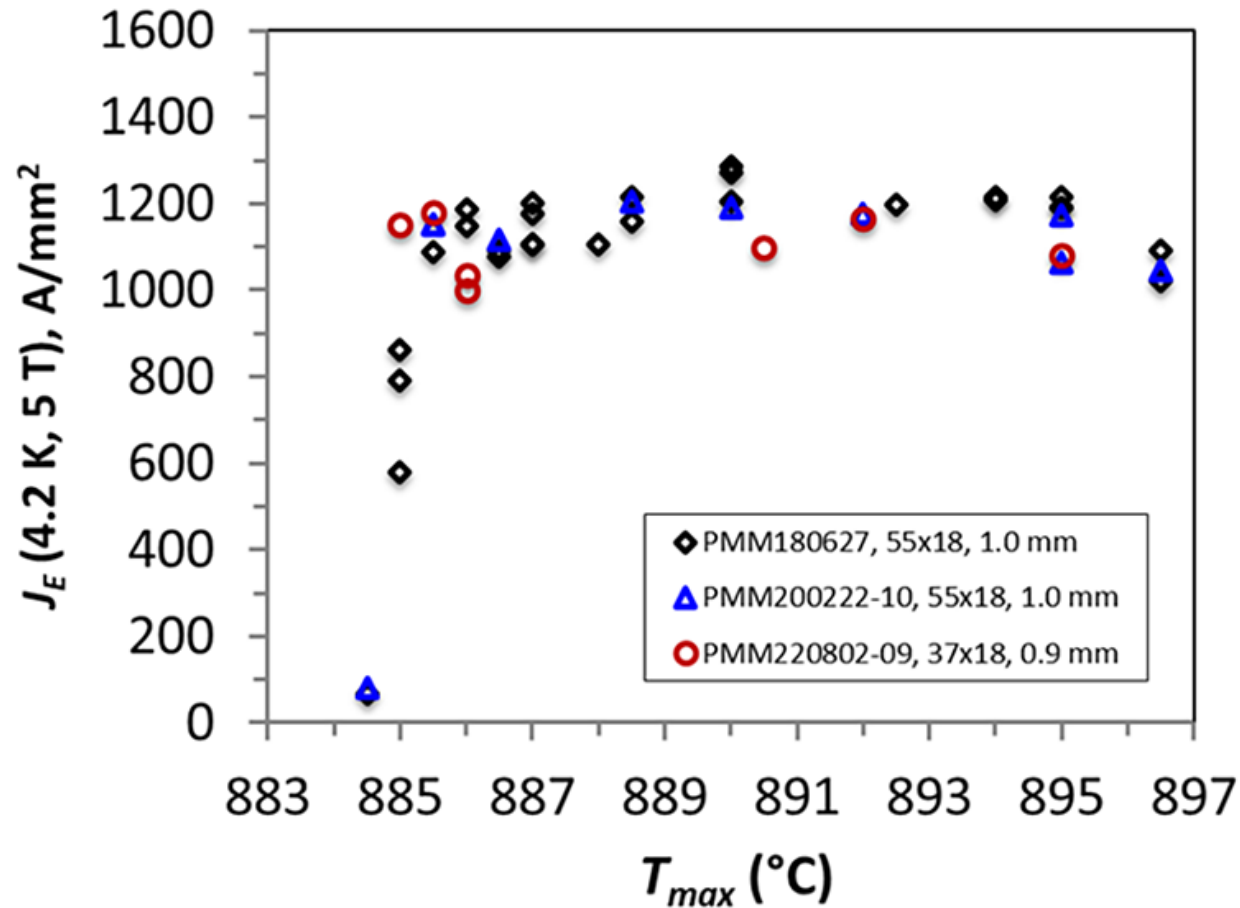
0.8 mm wire



1.0 mm wire



Wires with filament size $> 13 \mu\text{m}$ had a wider J_E plateau of $\sim 10^\circ\text{C}$



Filament size

- PMM180627 (1.0 mm): 14.5 mm
- PMM200222 (1.0 mm): 15.0 mm
- PMM220802 (0.9 mm): 14.9 mm

Summary

- **New PMM220802 (37x18) shows better performance than two recent CPRD billets PMM211105 (55x18) and PMM220329 (55x18).**
 - J_E (4.2 K, 5 T) plateau of 1100 A/mm² for PMM220802.
- **Wires with filament size > 13 μm had a wider J_E plateau of $\sim 10^\circ\text{C}$.**
 - PMM180627 (55x18, 1.0 mm, 14.5 μm ,)
 - PMM200222 (55x18, 1.0 mm, 15.0 μm)
 - PMM220802 (37x18, 0.8 mm (13.3 μm) and 0.9 mm (14.9 μm))

Our External Collaborators

- Daniel Bugaris, Claudia Goggin and Brian Mackey of **Engi-Mat**.
- Yibing Huang and Jeff A. Parrell of **Bruker OST**.
- Tengming Shen of **LBNL**.