

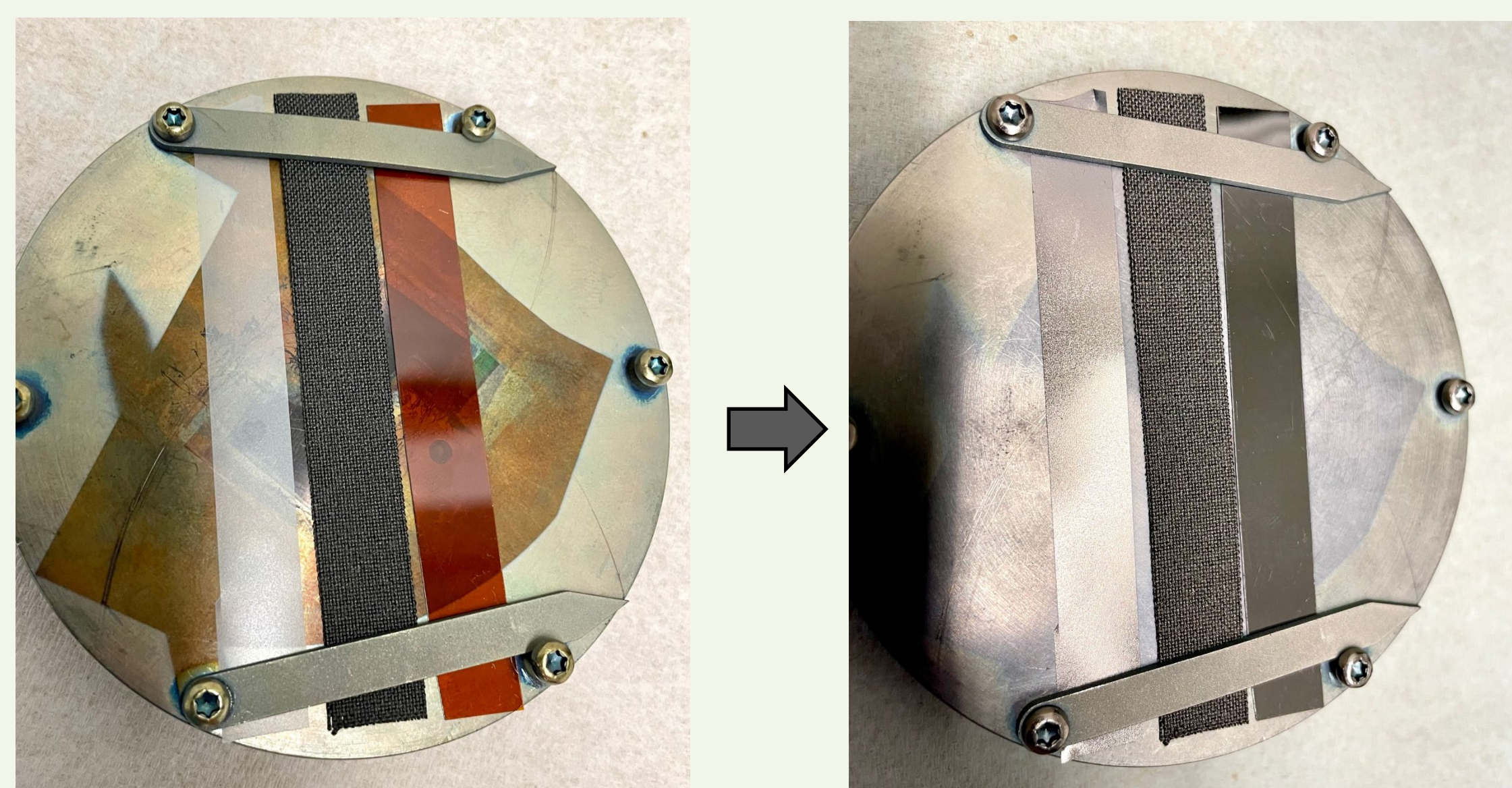
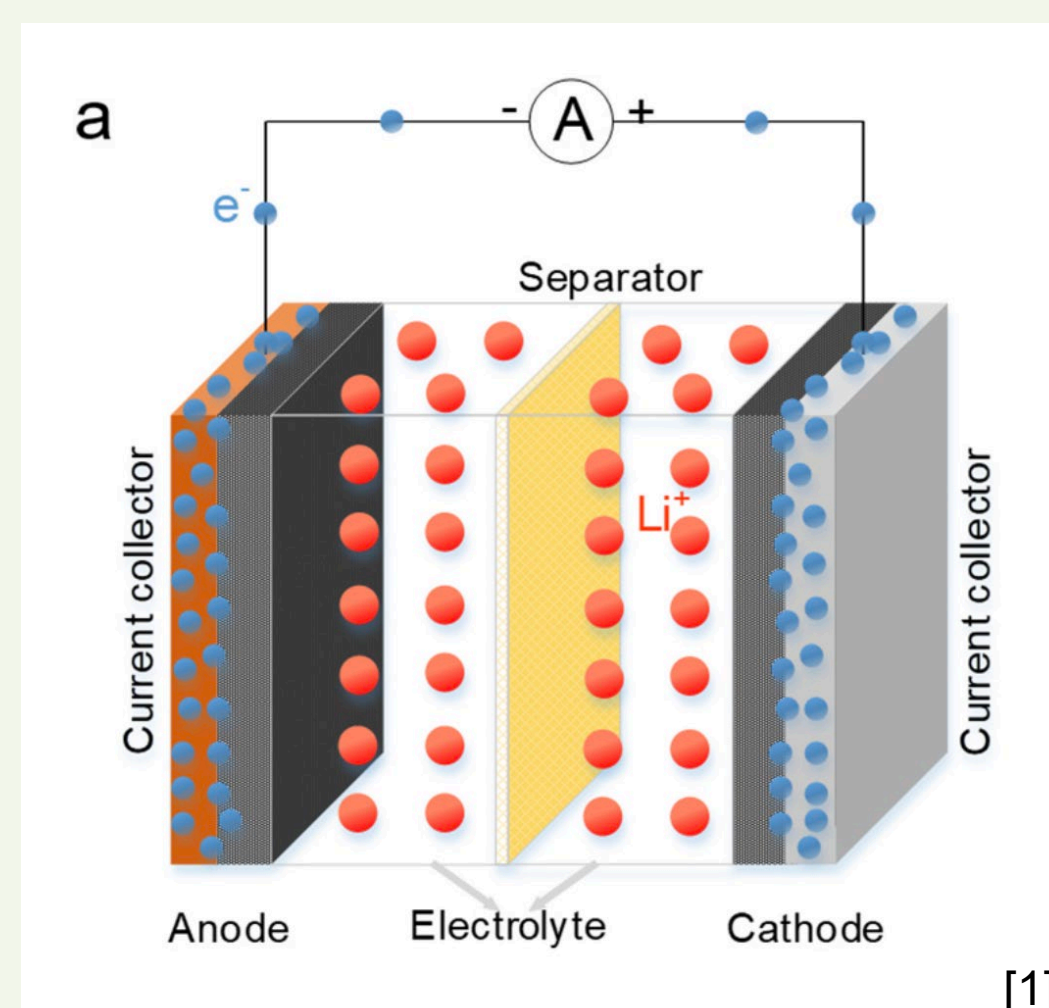
Ultralight and Flexible Copper-based Current Collectors for Flexible Li-ion Batteries

Abstract:

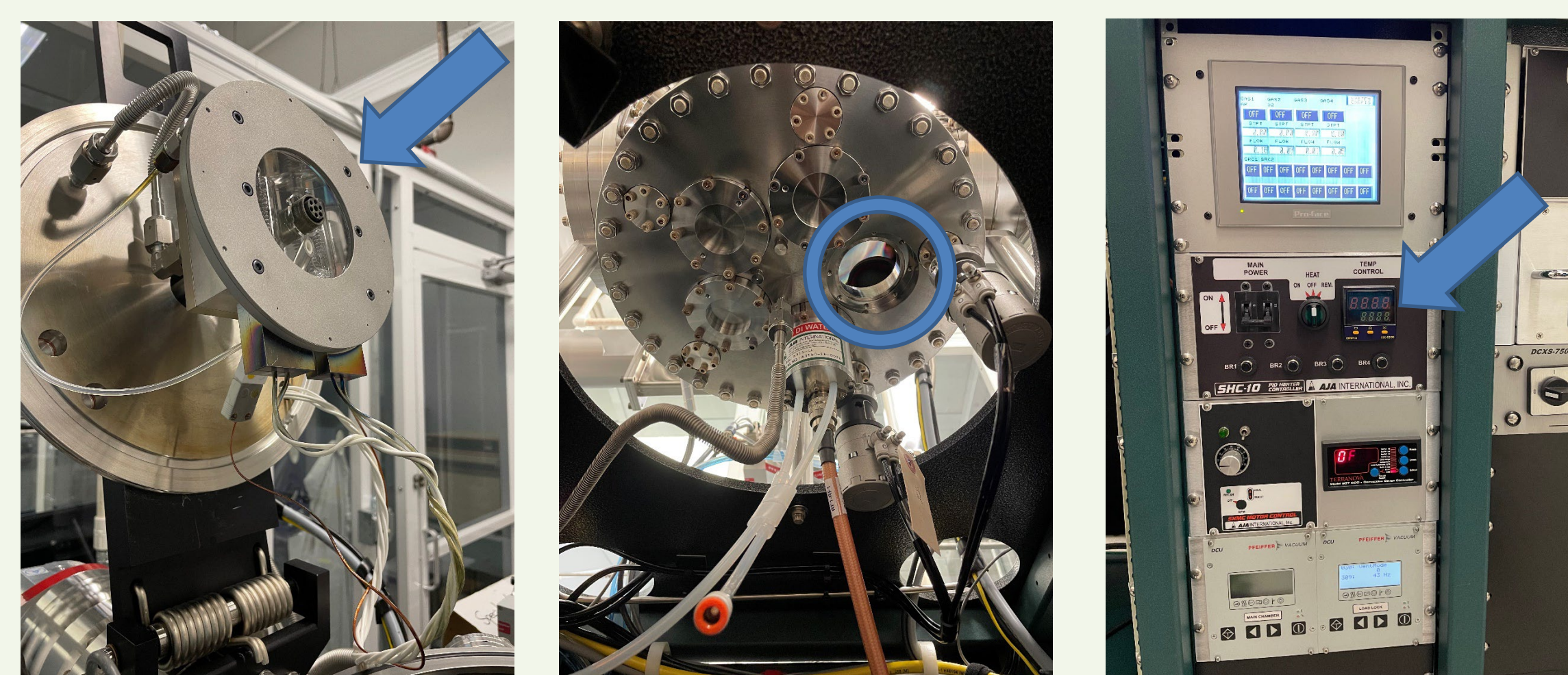
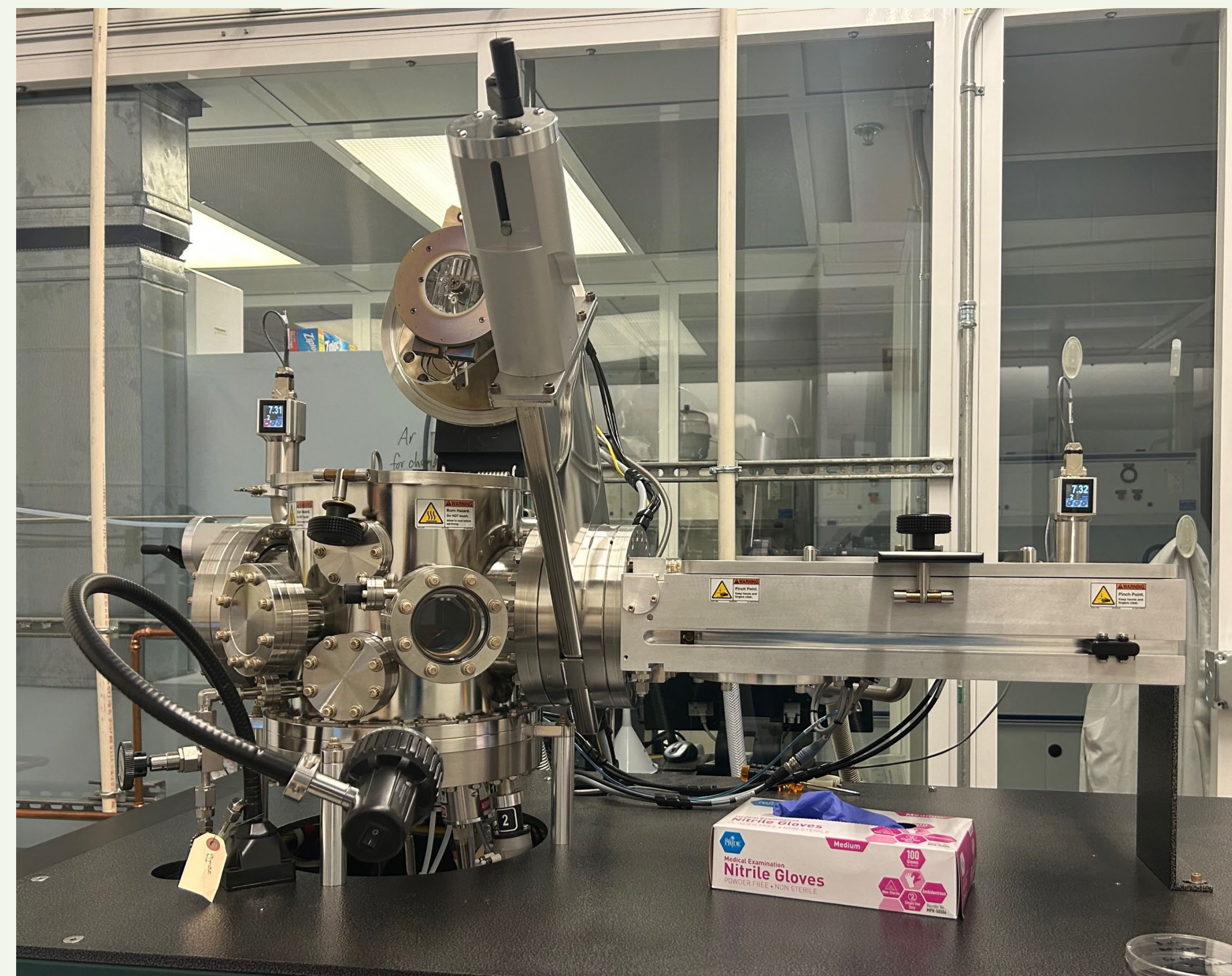
Current collectors are an integral component of lithium-ion batteries that connect the internal battery chemistry with the external electrical circuit. Magnetron sputter deposition is employed to deposit copper onto three selected flexible substrates. The deposition temperature and duration were varied, and the resulting influence on coating resistance and morphology was studied. Representative samples of each substrate were subjected to cyclic bending to evaluate the conductivity retention of samples after flexing.

Objectives:

- Repair sputter coater
- Fabricate samples
- Characterize influence of deposition conditions on sample resistivity

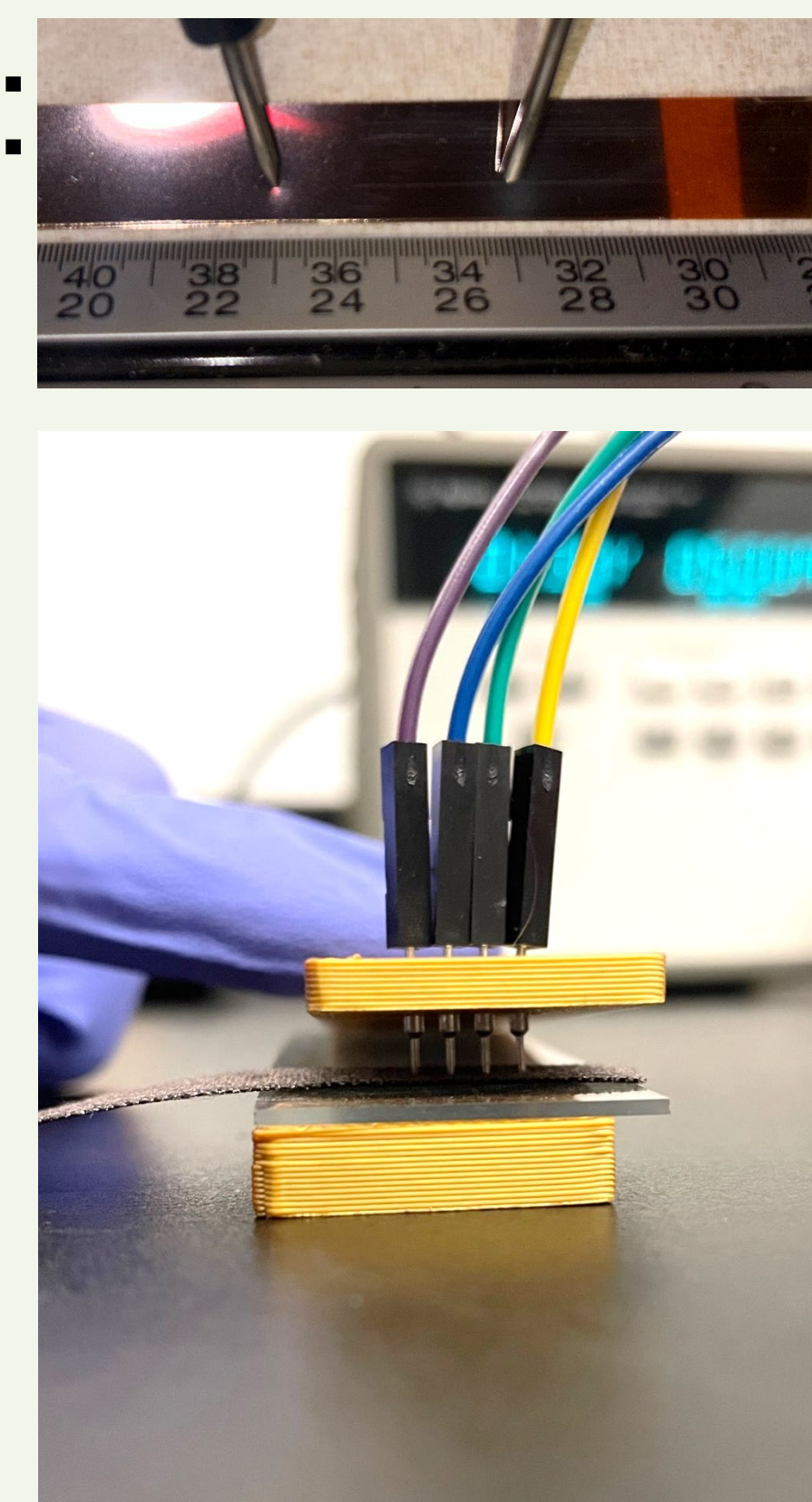
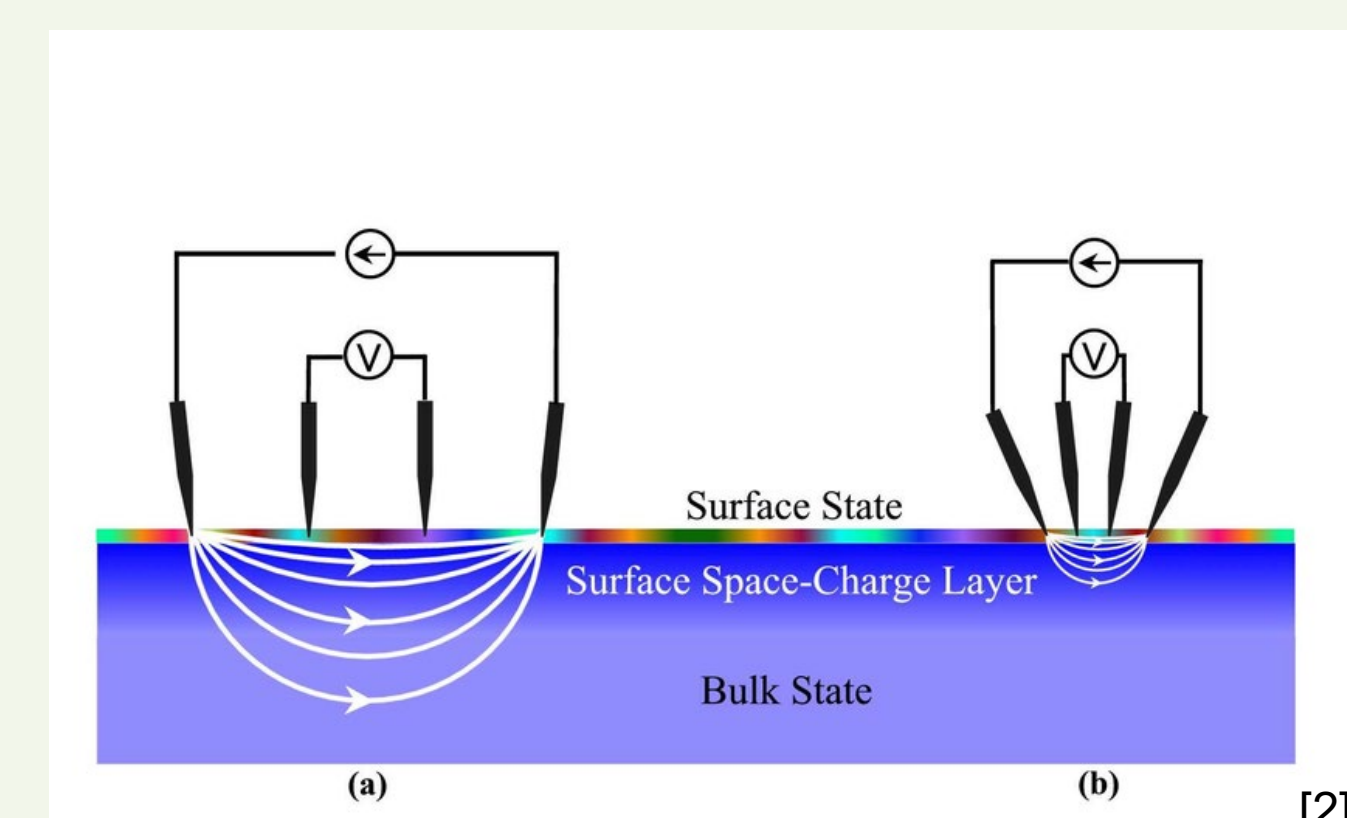


Coater Repair:

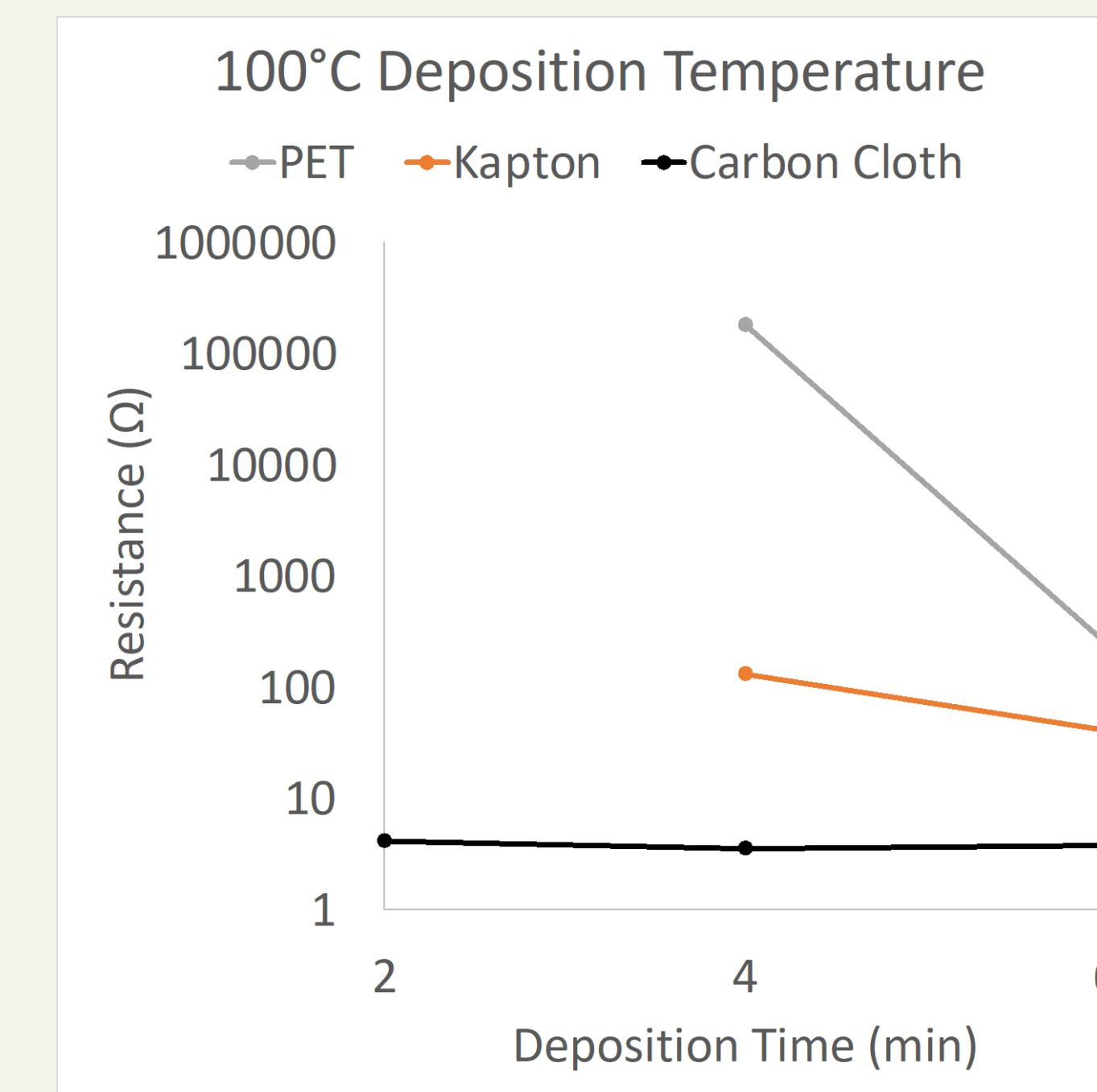
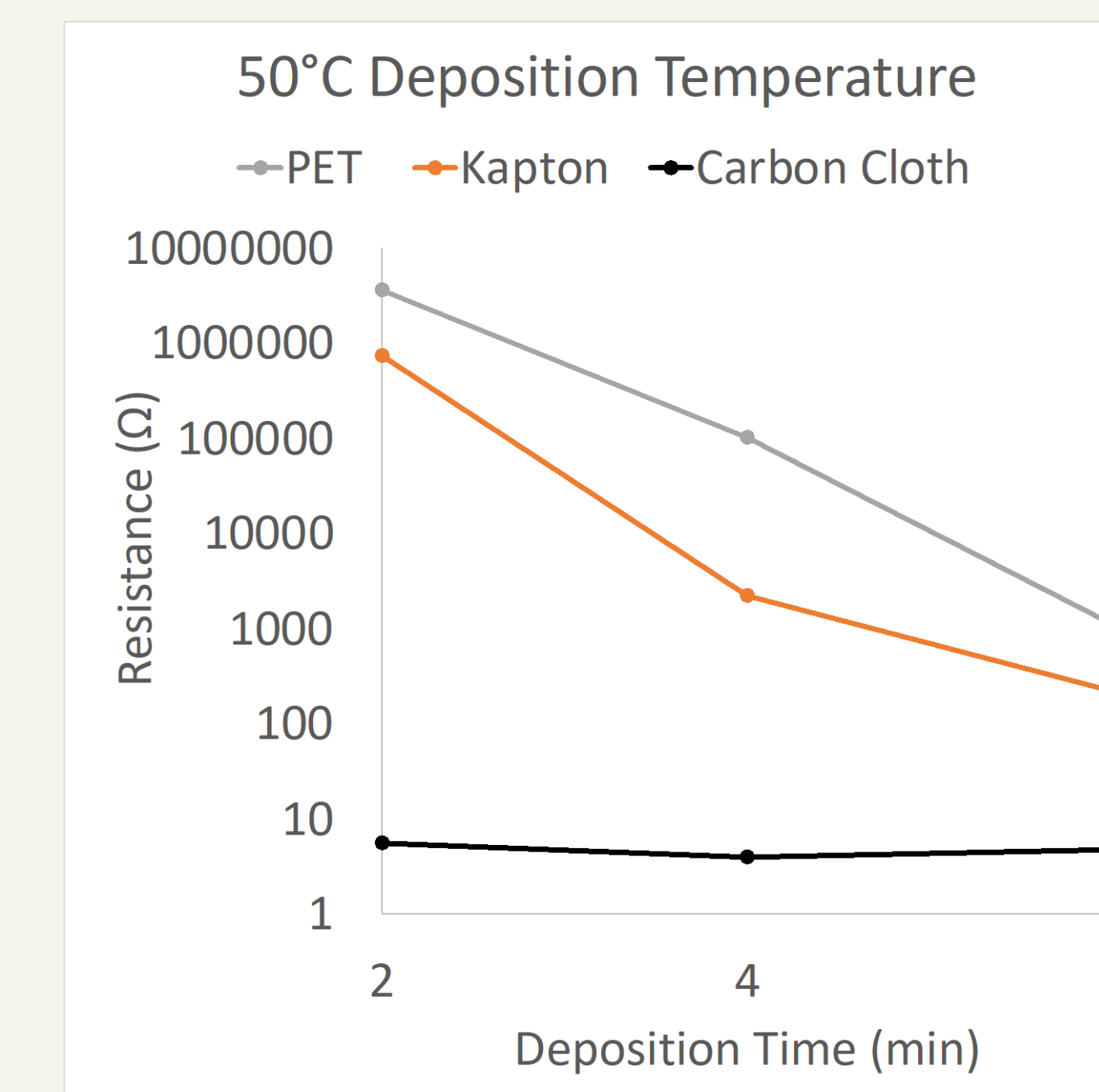
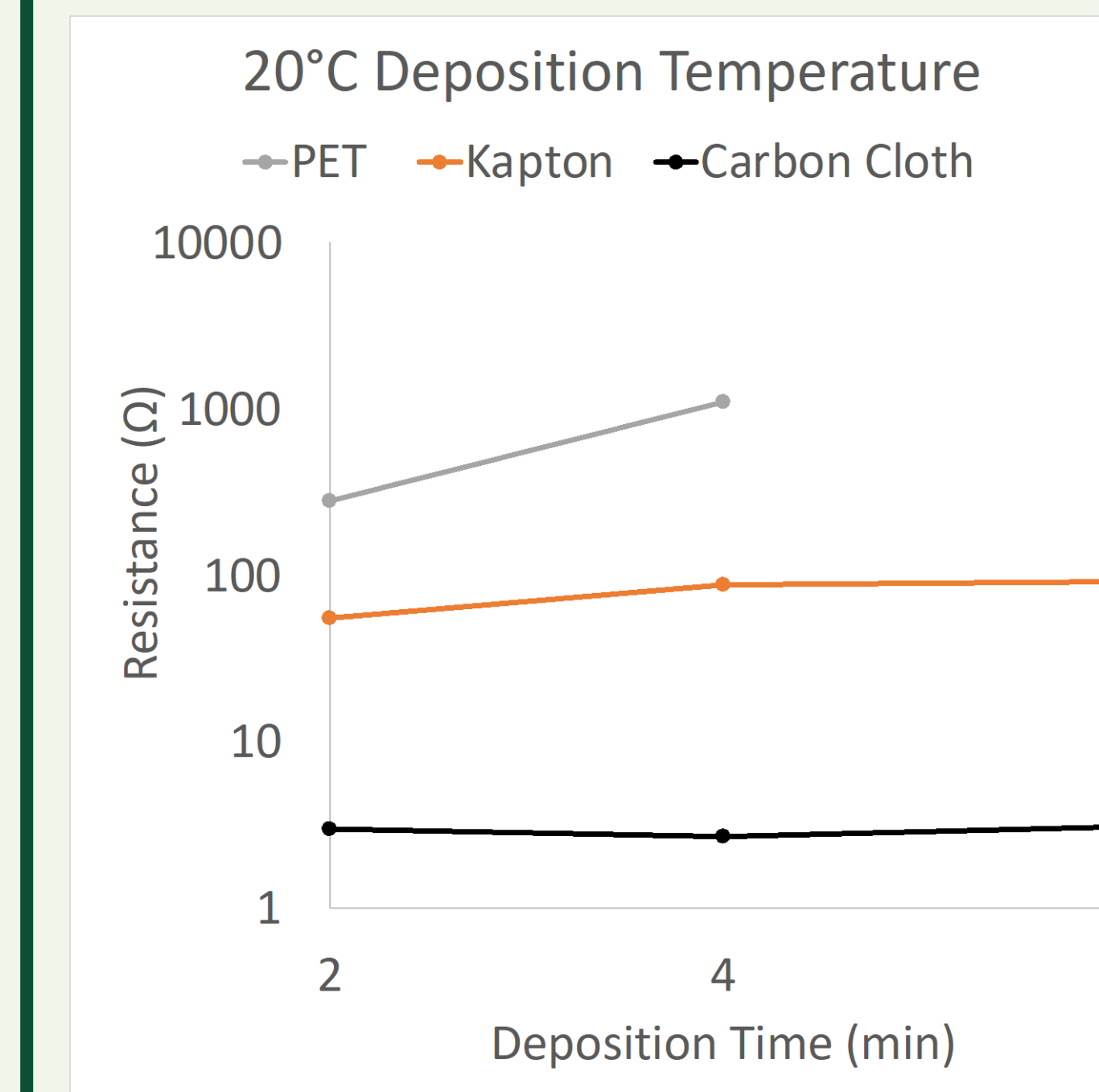


Resistance Testing:

A fixture was designed to evaluate the sheet resistance of the copper

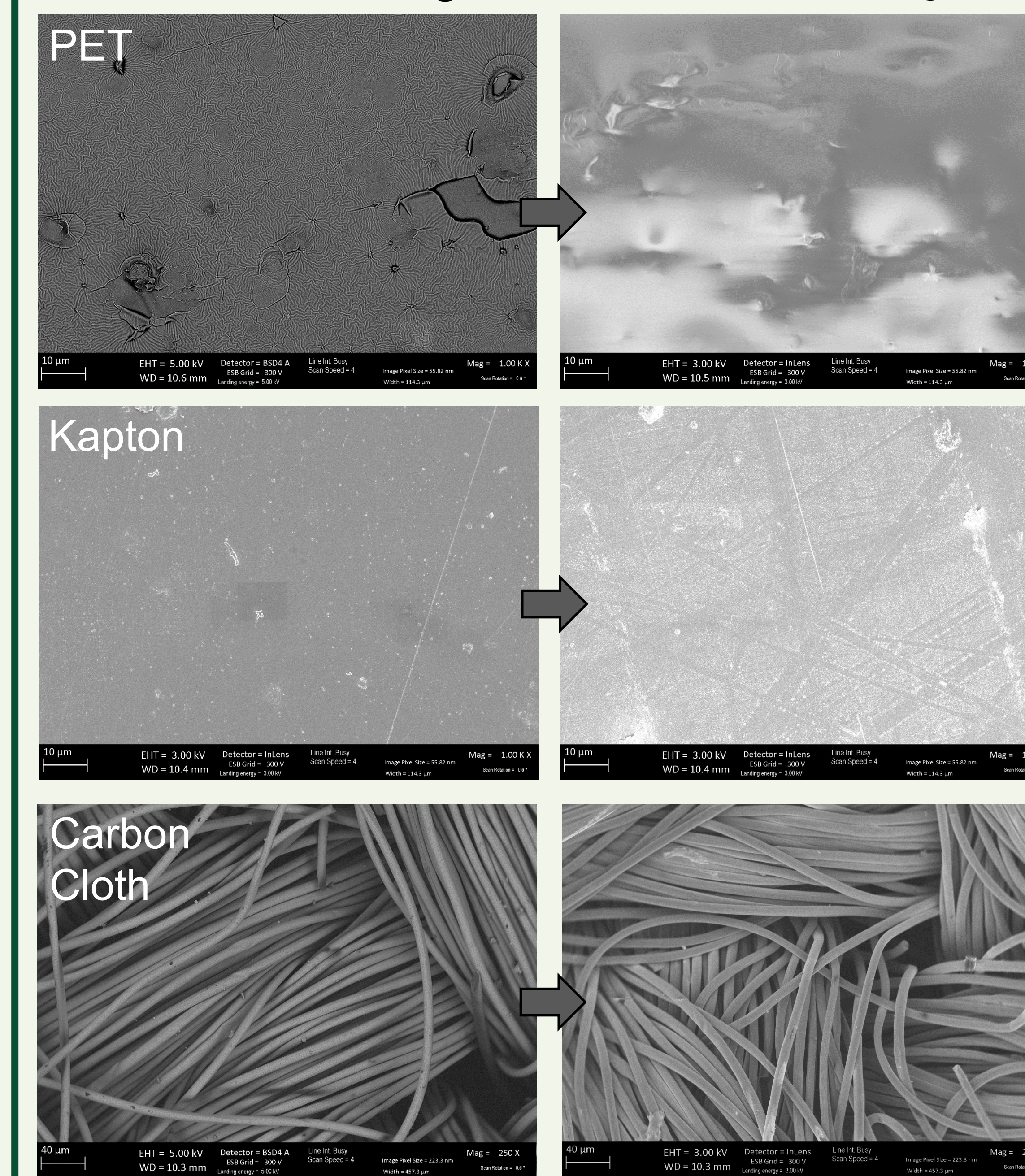


Results:

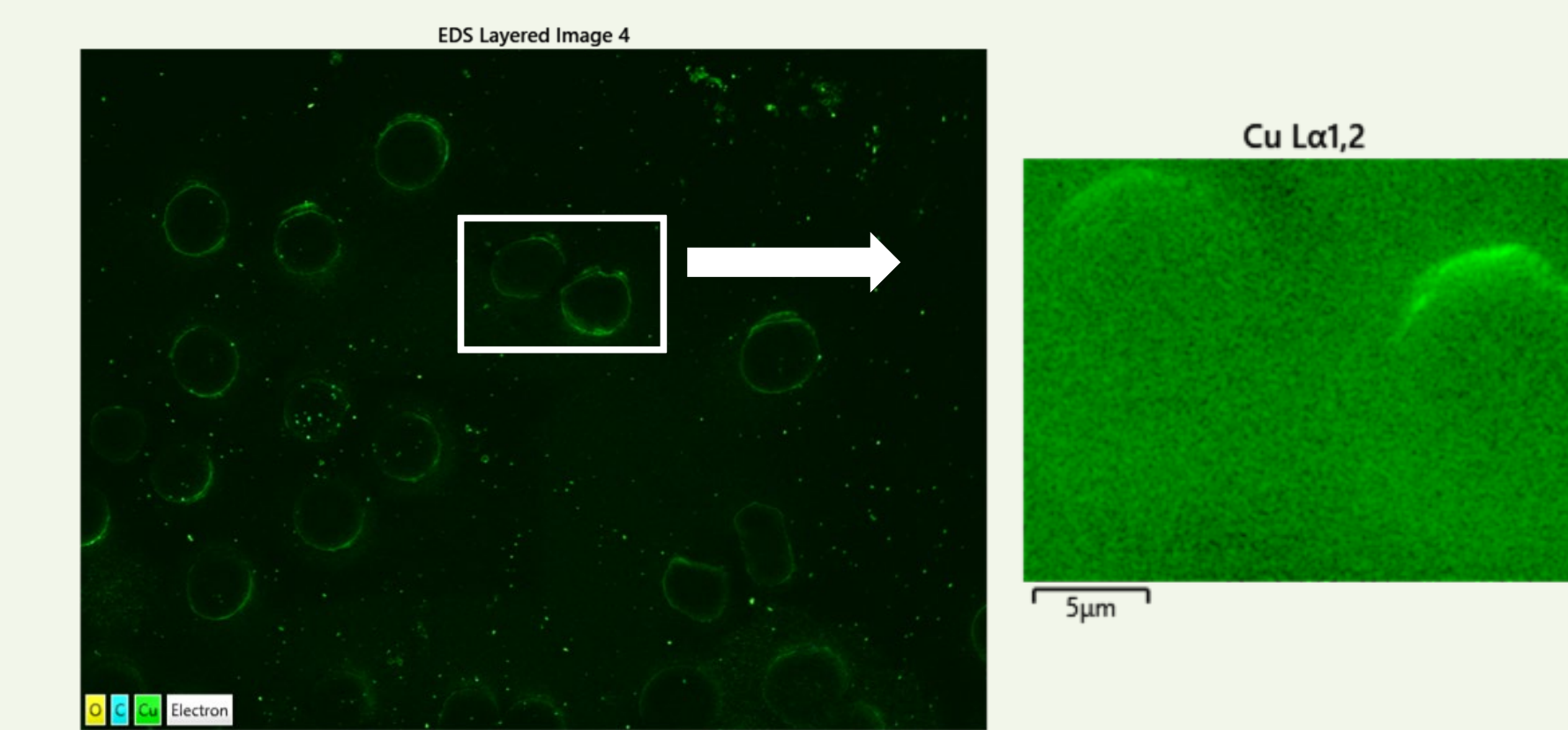


Before Flexing

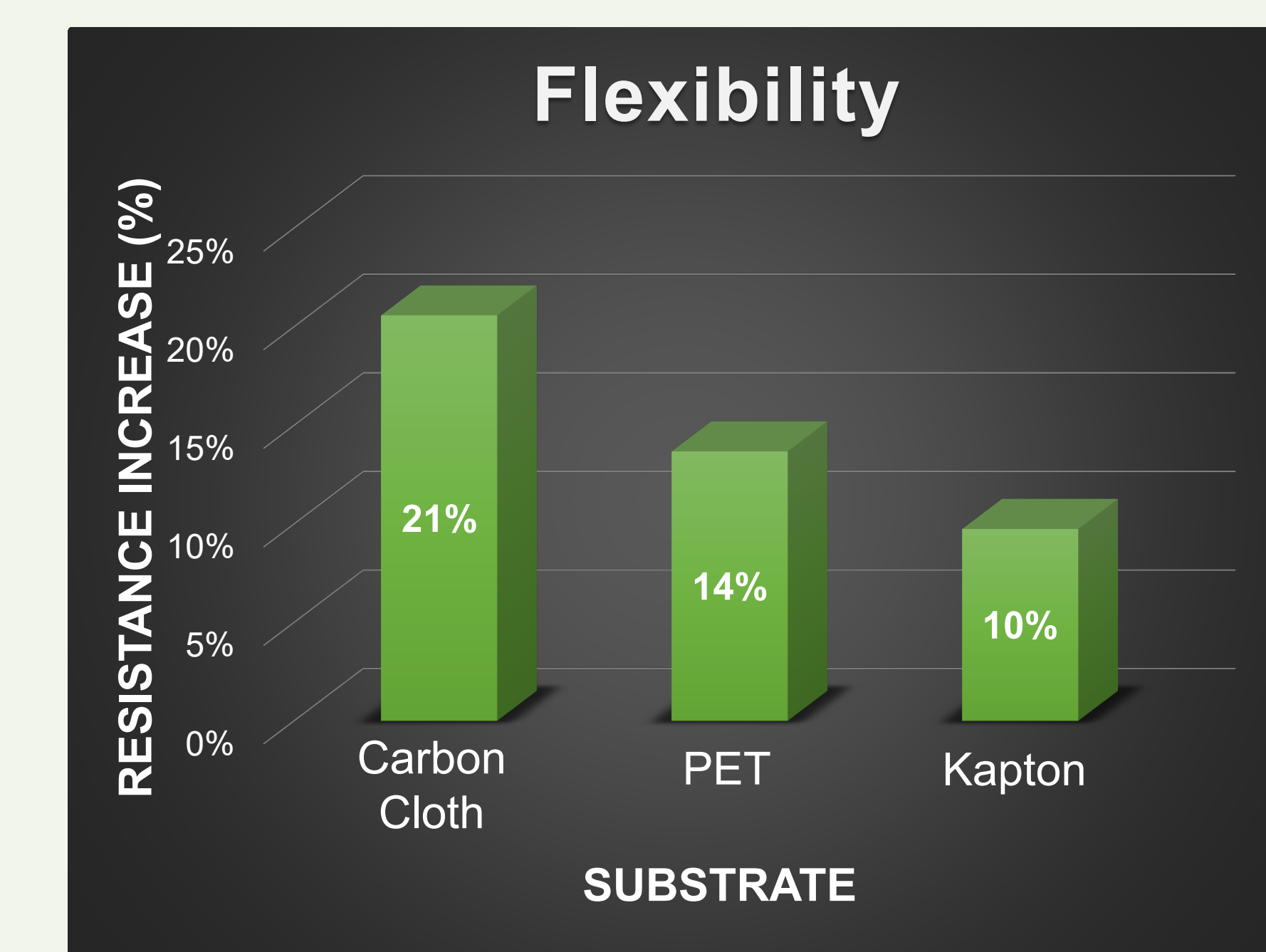
After Flexing



Verification of Copper Coating



Resistance Change via Bending



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Businesses Used:

AJA Inc.
McMaster Carr

SPONSOR:

Wright State University

References:

[1] P. Zhu, D. Gastol, J. Marshall, R. Somerville, V. Goodship, and E. Kendrick, "A review of current collectors for lithium-ion batteries," *Journal of Power Sources*, vol. 485, p. 229321, 2021, doi: 10.1016/j.jpowsour.2020.229321.
[2] S. Hasegawa et al., "Electrical conduction through surface superstructures measured by microscopic four-point probes," *Surface Review and Letters*, vol. 10, no. 6, pp. 963–980, 2003, doi: 10.1142/S0218625X03005736.