

MSE-8: MXene-Based Energy Harvesting Wearables

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Problem Statement:

Batteries and supercapacitors have limitations such as weight, low cycles to failure, and the ability to only store limited amounts of energy, requiring recharging.

Approach:

- Develop a flexible rectifying circuit to harvest Wi-Fi signals.
- Use MXene to integrate the circuit into wearables.

Results:

- Demonstrated that energy can be converted from GHz-frequency (*Wi-Fi*) EM signals to direct current using a rectifying circuit.
- MXene can be used to build a supercapacitor and antenna.
- A MXene yarn coating device has been designed to automate the process.

Discussion & Conclusions:

- The amount of harvested power was limited by FCC regulations and the power consumption of PIN diodes.
- Rather than large consumer devices, this product could be used for lower power electronics, such as sensors.

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