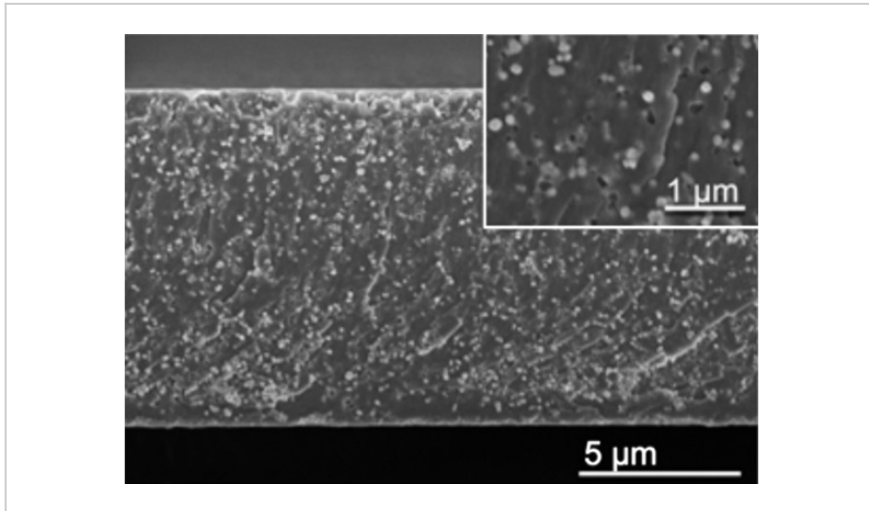


Sandwich-Structured Polymer Nanocomposites with High Energy Density

ID# 2016-4449



Single-layer polymer nanocomposites

Technology Summary

Existing polymer dielectrics have a limited energy density at high temperatures that inhibit significant size and weight reduction demanded for electric vehicle, pulsed power and aircraft systems and other high temperature applications.

The subject invention represents a multilayered film capacitor comprising of a polymeric composite containing nanodopants. Compared to existing polymer dielectrics, the invention's composites have improved heat dissipation properties that inhibit thermal runaway.

Application & Market Utility

The composite has a discharged energy density $> 0.6 \text{ J cm}^{-3}$, a charge-discharge efficiency $> 75\%$, a dielectric constant over 4, and a maximum operating electric field strength of at least 200 megavolt per meter at an operating temperature of 150°C. The dielectric properties, discharge power and microsecond discharge speed are stable from room temperature to 300°C and 100 hertz to 1MHz. Capacitors containing these composites have significantly improved cyclability (30,000+ cycles of charge-discharge) at elevated temperatures and showed no sign of degradation.

Next Steps

Seeking licensing opportunities. The invention's capabilities may allow system redesigns that reduce or eliminate active cooling systems, thereby lessening size, weight and energy consumption, while improving the system's performance and reliability.

TECHNOLOGY READINESS LEVEL

4-7

Seeking

Investment | Licensing | Research

Keywords

- film capacitor
- energy storage
- hybrid and electric vehicles
- US Patent Application No. 16/320,919
- high temperature dielectric polymers

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