Abstract Submitted
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High Energy Density and High Temperature Multilayer Capacitor Films for Electric Vehicle Applications[1] IMRE TREUFELD, MICHELLE SONG, LEI ZHU, ERIC BAER, Case Western Reserve University, JOE SNYDER, Orbital Research Inc., DEEPAK LANGHE, Polymer Plus LLC. — Multilayer films (MLFs) with high energy density and high temperature capability (>120 °C) have been developed at Case Western Reserve University. Such films offer a potential solution for electric car DC-link capacitors, where high ripple currents and high temperature tolerance are required. The current state-of-the-art capacitors used in electric cars for converting DC to AC use biaxially oriented polypropylene (BOPP), which can only operate at temperatures up to 85 °C requiring an external cooling system. The polycarbonate (PC)/poly(vinylidene fluoride) (PVDF) MLFs have a higher permittivity compared to that of BOPP (2.3), leading to higher energy density. They have good mechanical stability and reasonably low dielectric losses at 120 °C. Nonetheless, our preliminary dielectric measurements show that the MLFs exhibit appreciable dielectric losses (20%) at 120 °C, which would, despite all the other advantages, make them not suitable for practical applications. Our preliminary data showed that dielectric losses of the MLFs at 120 °C up to 400 MV/m and 1000 Hz originate mostly from impurity ionic conduction.

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