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Sponsoring Units: DPOLY GSNP DCP DCOMP

Chair: Jihong Ma, Oak Ridge National Lab

Abstract: R35.00007 : Enhancing the Dielectric Breakdown Strength of Solid-State Polymer Capacitors by Chain End Manipulations*

← Abstract →

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The need for high power density, flexible and light weight energy storage devices requires the use of polymer film-based dielectric capacitors. Theoretically, it has been shown that chain ends contribute adversely to electrical breakdown, resulting in low energy density in polymer capacitors. In this work, we enhanced the energy density of polymer capacitor by using well-ordered high molecular weight block copolymer (BCP), in which the chain ends are segregated to narrow zones. Cyclic homopolymers (no chain ends) and linear homopolymers having chemistry-controlled chain ends also show enhanced breakdown strength, resulting in higher energy density as compared to the linear counterparts. These novel insights into manipulating chain end distribution such as in BCPs and with molecular topology to increase the energy density of polymers will be helpful for fulfilling next-generation energy demands.

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