



Polymer Dielectrics: Crystalline Materials as Energy Storage Systems

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Message from the Guest Editors

Most polymers are dielectrics and thus are employed as electrical insulators to protect conducting cables from environmental damage and guarantee safe use. When an electric field is applied to a dielectric material, capacitive electrical energy can be stored due to polarization effects, a phenomenon that can be used in rechargeable energy storage devices. The storage properties can be tailored by adding high permittivity nano-inclusions.

The crystallinity and crystal morphology affect the dielectric properties by enhancing interfacial polarization phenomena and increase the dielectric breakdown strength due to a higher resistance to electrical treeing. The observed increase in breakdown strength is correlated with crystal orientation, because the crystallites provide higher barriers against electrical failure. For example biaxial orientation of semi-crystalline polymers, like polypropylene, has found use in thin dielectric films for capacitors in electrical energy storage power applications.





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Message from the Editor-in-Chief

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