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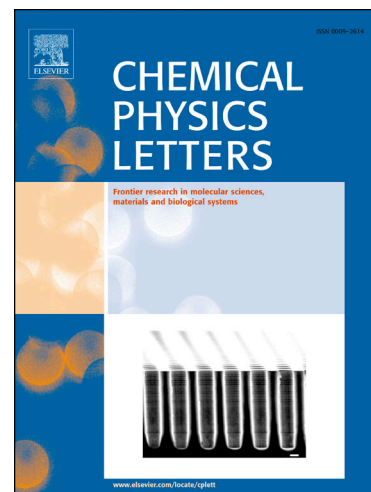
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# Composite material with high dielectric constant and low dielectric loss obtained through grafting of cyano groups in imidazolium ionic liquids

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## Abstract

A strong polar cyano group was introduced to increase the interfacial polarization between filler and matrix, thereby improving the dielectric properties of polymer composites. 3-Cyanomethyl-1-vinyl imidazolium bromide (CMVImBr) ionic liquid was first synthesized, copolymerized with divinylbenzene on the surface of carbon nanotubes (CNTs) to form a core-shell structured hybrid, and then compounded with epoxy to prepare a filler-well-dispersed composite with high dielectric constant. The dielectric constant of the composites reached 139 at 1 kHz when the filler content was 20%, and the dielectric loss was only 0.088. The cyano groups and ionic bonds from CMVImBr played a significant role in increasing the dielectric constant owing to interfacial polarization. Moreover, the crosslinked polymer shells decreased the dielectric loss and served as electrical barriers between CNTs, which are desirable properties for electronic devices.

**Keywords:** Carbon nanotubes; Nanocomposites; Ionic liquids; copolymerization; cyano groups; dielectric properties

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