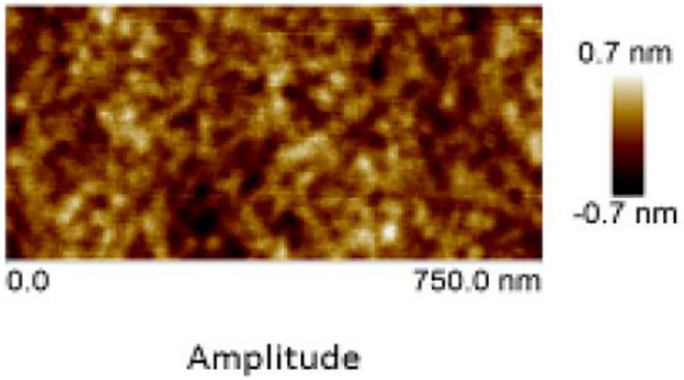
Nano-structure Engineered Dipolar Polymers of High Glass Transition

ID# 2016-4459



Nano-scale mixing of polymers

Technology Summary

The subject invention covers a class of high glass transition (Tg) of nanocomposites and dipolar polymers that have stable dielectric constants with dielectric constant higher than 5 losses less than 1% for temperature ranges from -100 oC to 225oC. These dielectric composites have glass transition temperature Tg> 170oC that can operate at high temperatures (>150 oC), thereby lessening the requirements for external cooling systems that prevent thermal runaway of the capacitors. The inventors have resolved the well-known trade-off of dielectric loss that accompanies increases in the dielectric constant. In addition to interfacial agents of dielectric insulators, the invention covers certain compositional and particle size ranges that allow for the desired conditions that facilitate this effect without compromising the breakdown field as well as the dielectric polymer processing properties.

Application & Market Utility

The invention has been reduced to practice as polymer film capacitors having high dielectric constant (>5), low dielectric loss (<1%), and high thermal stability as well as polymer film capacitors with the dielectric constant > 7 and loss < 1.5%, and high thermal stability. The invention can be applied to commercial polymer dielectric films to raise their dielectric constant while maintaining low loss and high breakdown field without affecting polymer film fabrication properties as well as cost.

Next Steps

Seeking licensing opportunities.

TECHNOLOGY READINESS LEVEL 4-7

Seeking

Investment | Licensing | Research

Keywords

- polymer film capacitors
- energy storage
- high temperature capacitors
- polymer blends
- U.S. Patent No. 10,832,868

Researchers

Qiming Zhang
Distinguished Professor of Electrical Engineering
Online Bio
Website

Originating College

College of Engineering

Office of Technology Management Contact

Smith, Matthew
mds126@psu.edu
814-863-1122