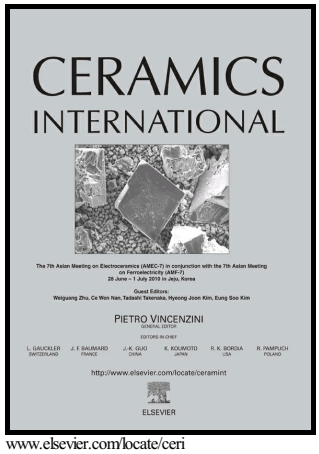

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Enhanced dielectric permittivity and thermal conductivity of hexagonal boron nitride/poly(arylene ether nitrile) composites through magnetic alignment and mussel inspired co-modification

Yingqing Zhan[a,b,c*], Zhihang Long[a], Xinyi Wan[a], Chenhao Zhan[a], Jiemin Zhang[a], Yi He[a,b,c*]

[a]School of Chemistry and Chemical Engineering, Southwest Petroleum University, 8 Xindu Avenue, Chengdu, Sichuan 610500, China

[b]Oil & Gas Field Applied Chemistry Key Laboratory of Sichuan Province, Southwest Petroleum University, Chengdu, Sichuan, China, 610500

[c]State Key Lab of Oil and Gas Reservoir Geology and Exploitation, Southwest Petroleum University, 8Xindu Avenue, Chengdu, Sichuan 610500, China

zhanyingqing0825@163.com

heyi007@163.com

[*]Correspondence to:

Abstract:

In this work, we present novel hexagonal boron nitride (h-BN)/poly (arylene ether nitrile) nanocomposites with high dielectric permittivity and thermal conductivity. For this purpose, the interfacial adhesion and orientation of nanofillers are the two key factors that need to be considered. Firstly, iron oxide was attached onto the surface of h-BN to obtain magnetically responsive property, which would realize the orientation of h-BN by applying an external magnetic field during the preparation process of PEN composites. Secondly, the magnetic h-BN was further modified by mussel-inspired method with dopamine and secondary functional monomer (KH550). It was found that the alignment of h-BN and improvement of interfacial adhesion resulted in the interesting properties of PEN composites. With addition of 30 wt% modified h-BN, the dielectric permittivity of PEN composites was increased from 3.2 of neat PEN to 16.4 (increased by 413%), and the low dielectric loss was remained. Meanwhile, the thermal conductivity was enhanced to 0.662 W/mK (increased by 140%) at the same