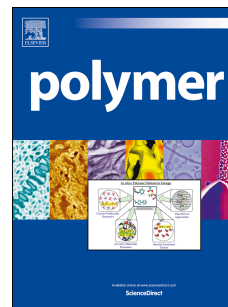


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Dynamics of model polycyclic aromatic hydrocarbon compound-epoxy composites: A dielectric study

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8 ABSTRACT

9 A model polycyclic aromatic hydrocarbon (PAH) compound, anthracene, was incorporated
10 into a thermosetting epoxy matrix as a reinforcing moiety via physical dispersion and/or
11 chemical modification. In order to understand the “additive effect” of glass transition
12 temperature (T_g) observed with the variation of free anthracene (AN) and bonded 2-
13 aminoanthracene (2-AM) loading, the relaxation dynamics were investigated by broadband
14 dielectric spectroscopy. Within the measurement range of 0.01 Hz to 1 MHz and -60 to 130 °C,
15 three relaxation processes, namely normal mode (n-mode) relaxation, α relaxation, and β
16 relaxation, were observed for all epoxy composites with bonded and/or unbound anthracene.
17 After eliminating the strong effect of ionic conduction by using the logarithmic derivative
18 approximation $\varepsilon'' \propto \partial\varepsilon'/\partial \ln \omega$, derived from the Kramers-Kronig relations, the n-mode
19 relaxation occurring at low frequencies above T_g for the rigid epoxy system is revealed. The
20 Arrhenius diagram showing the temperature dependence of each relaxation process for the PAH-
21 epoxy composites was obtained after parametric fitting using the Havriliak-Negami (HN)
22 function in the frequency domain. The segmental α relaxation was more strongly impacted than

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