Phase Distribution of Carbon Black filler in Polymer Blend

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Methods

- Polymer blend used is PBD/SBR
- Filler used is Carbon Black N110 (CB)

Unified Scattering Model\textsuperscript{2}

\[ I_0(q)/\phi_0 = \sum_{i=1}^{n} G_i \exp(-q^2 R_{g,i}^2/3) + B_i(q^2) \exp(-q^2 R_{g,i-1}^2/3) \]

Random Phase Approximation\textsuperscript{3}

\[ \phi/I(q) = \phi_0/I_0(q) + \phi \nu \]

\[ A_2 = \frac{(\Delta \rho)^2}{2 \rho^2} N_A \]

Filler Distribution

1. Filler predominantly distributes to PBD or SBR phase
2. Filler segregates at interface
3. Filler uniformly distributed between SBR and PBD phases
4. Filler partially segregates between SBR and PBD phases

Introduction

- Properties of processed polymers depend on not only the volume fraction but dispersion of fillers
- In the matrix of immiscible polymer blends, added fillers unevenly distributes to each component of the blend
- The distribution of fillers was previously studied based on the wetting coefficient which is related to interfacial free energy\textsuperscript{1}
- In this research, we are studying the distribution of fillers in the polymer blend through pseudo-second order virial coefficient A2.

Experiments

- Polymer blend used is PBD/SBR
- Filler used is Carbon Black N110 (CB)

References


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