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Fabrication of pristine graphene-based conductive polystyrene composites towards high performance and light-weight

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Abstract: Although highly electrically conductive polymer composites filled with two-dimensional graphene-based nanofillers have been considerably explored, it still remains a challenge for constructing these nanocomposites with high filler efficiency, mild fabricating condition, as well as more effective conductive network at lower nanofiller contents. To meet above objectives, a facile preparation strategy was designed, wherein the pristine graphene (*p*GR) was utilized as nanofiller in polystyrene (PS) particle matrix via latex technology. Owing to the absence of reduction process, the hot-processing parameters were optimized to be more gentle ones. The structural, morphological, electrical, thermal and mechanical properties of resultant PS/*p*GR nanocomposites with various *p*GR contents were systematically investigated. SEM and TEM images showed the excellent interfacial adhesion between these two materials and segregated conductive structure was well-established. The as-fabricated PS/*p*GR composites achieved a quite high electrical conductivity of 20.5 S/m at a relatively low *p*GR loading of 0.957 vol% and an ultralow electrical percolation threshold of 0.0475

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