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**The Dielectrophoretic Motion of Clays within Polymer Matrix
under AC Electric Field**

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The incorporation of layered silicates into polymers provides an exciting way of designing materials whose value-added properties cannot be shared by conventional composites. Morphology control is a crucial step toward the realization of composite design for property optimization. Many challenging attempts have been made especially to fabricate exfoliated structured nanocomposites because exfoliated structure has been recognized as a better morphology for higher performance than intercalated structures. However, the processing is so system specific and not even well-defined to facilitate the destruction of the layer-stacking and yet achieve the uniform distribution of layered silicates. Much less established are approaches to deal with spatial and orientational control of the hierarchical morphology. In this talk, we present the potential use of dielectrophoretic motion of clays under AC electric field as a way to realize the morphology design in polymer/clay nanocomposites. AC field with low frequency induces oscillating motion of clays within polymer matrix resulting in extraordinary rheological behavior. An analysis of output torque data from the rheometer confirms the oscillation of G' resulting from the dielectrophoretic motion of clays under AC field. The in-situ observation of the transient clay motion under AC field opens a possibility of directing the nanoelement in the polymer/clay nanocomposites to the desired direction.