Dispersion and composite processing of polymer coated graphene
SRIYA DAS, AHMED WAJID, JOHN SHELBURNE, ABEL CORTINAS, MICAH GREEN, Texas Tech University — Liquid phase exfoliation and dispersion of graphene, i.e. single layer graphite, is a critical challenge for bulk processing of graphene into advanced materials and devices. We demonstrate a suite of techniques for dispersing pristine graphene using polymer coatings for the purpose of liquid-phase nanocomposite processing. First, we illustrate a unique in situ polymerization technique to develop localized polymer coatings on the surface of dispersed pristine graphene sheets in solution. These polymer coatings do not disrupt the pristine structure or superior properties of the graphene sheets; instead, these coatings allow for stable, aggregation resistant graphene dispersions, as characterized through rheology, SEM, and AFM. We also demonstrate that certain polymers naturally wrap and stabilize pristine graphene in various organic solvents. We use this technique to prepare epoxy and PVA nanocomposites loaded with polymer-wrapped graphene as filler.