Interfacial assembly of Graphene Oxide at oil/water and polymer/polymer interfaces

ZHIWEI SUN, TAO FENG, THOMAS RUSSELL, University of Massachusetts Amherst — Amphiphilic structure of graphene oxide makes it a candidate “surfactant” to preferentially segregate to the interface between different fluids. The affinity of graphene oxide towards different phases was tuned by grafting with polystyrene (PS-NH$_2$) through hydrogen bonding, and its interfacial behavior, both in toluene/water and polystyrene/poly(methyl methacrylate), was studied. The surface tension of the toluene/water interface decreases in the presence of PS-NH$_2$ grafted graphene oxide, indicating that graphene oxide flakes can be forced to the toluene/water interface when grafted with PS-NH$_2$. Transmission electron microscopy shows that graphene oxide can even be forced into a “jammed” state at the water/toluene interface. In addition, polystyrene and poly(methyl methacrylate) were blended with graphene oxide, its morphology changes from island type to co-continuous structure, but the mechanism of this behavior is still not clear. These interfacial sheets may provide a model system to study buckling and crumpling behavior at interfaces.