Janus Graphene Oxide Nanosheets
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Janus particles, those with two faces of distinct chemical functionality, are of interest in a number of applications due to unique self assembly, catalytic, and interfacial properties compared to their symmetrically functionalized analogues. While most such particles are spherical, two-dimensional platelets are of increased interest due to their high surface area and aspect ratio which give complimentary and contrasting properties. Herein we present the preparation of Janus nanoplatelets based on graphene oxide (GO) sheets by orthogonal functionalization of the two faces. GO has found widespread use when dispersed in polymer matrices due to antimicrobial properties, mechanical strength, gas barrier, and precursor to conductive materials. We report the covalent modification of two dimensional GO platelets, using the Pinner reaction in an aqueous acidic environment. We will also discuss the selective functionalization of one face of graphene oxide and the orthogonal functionalization of the two faces of the platelets as a route to prepare Janus platelets with defined interfacial properties. This work can thus be used to control the dispersability and assembly of GO into higher order structures and at interfaces.

Bio: Emily obtained a Bachelor of Science in Chemistry from Butler University, USA in 2005. She then moved to Northwestern University, USA where she completed her PhD in 2010 under the supervision of Professor SonBinh T. Nguyen working on the development of new monomers for ring-opening metathesis polymerization to prepare biodegradable polymers. Between 2010 and 2013 she was a postdoctoral researcher at the University of Massachusetts Amherst, USA where she investigated the synthesis and assembly of n-type and p-type materials for organic photovoltaic applications, supervised by Professor Todd Emrick in the Department of Polymer Science and Engineering. Since July 2013, Emily has been at Case Western Reserve University, USA as an Assistant Professor of Chemistry. Her research addresses application-based materials problems in the areas of energy harvesting, management, and storage by using synthetic chemistry to tailor molecular design and control self-assembly for the preparation and study of novel conductive materials with controlled domain sizes and interfaces. Emily also serves as an Associate Editor for Polymer Chemistry and publicity co-chair for the POLY division of the American Chemical Society.