

Abstract Submitted  
for the MAR15 Meeting of  
The American Physical Society

**Tailored crumpling and unfolding of spray-dried pristine graphene and graphene oxide nanosheets** DORSA PARVIZ, Texas A&M Univ, SRIYA DAS, FAHMIDA IRIN, Texas Tech Univ, MICAH GREEN, Texas A&M Univ — 3D Crumpled graphene was directly obtained from aqueous dispersions of pristine graphene using an industrially scalable spray drying technique. Capillary forces during the water evaporation induced the crumpling of nanosheets to multi-faced dimpled morphology. For the first time, the transition of 2D graphene nanosheets to a 3D crumpled morphology was directly observed inside the spray dryer. Graphene oxide (GO) was spray dried using the same procedure; however, their highly wrinkled final morphology was different than the crumpled pristine graphene nanosheets. The degree of crumpling of the nanosheets was controlled by changing the dimensionless ratio of evaporation rate to diffusion rate. Crumpled particles were redispersed into various solvents to evaluate their morphological changes as a response to rewetting. Crumpled GO nanosheets remained crumpled as a response to hydration, while the pristine graphene nanosheets unfolding behavior was solvent-dependent. This study holds significance for both fundamental understanding of the origins of nanosheets crumpling and also for the use of crumpled nanosheets for further material processing.

Dorsa Parviz  
Texas A&M Univ

Date submitted: 14 Nov 2014

Electronic form version 1.4