Colloidal Graphene Quantum Dots and Their Potential Applications for Renewable Energy

Liang-shi Li

Indiana University, Department of Chemistry, Bloomington IN 47405

Nanostructures of graphene have recently drawn increasing attention because of their tunable, finite bandgap. Because graphene is two-dimensional and is made of carbon, a light element, quantum confinement in graphene leads to phenomena dramatically different from nanostructures of other semiconductors. Meanwhile, nanostructures of graphene can be found in many technologically important complex carbon materials such as activated carbon, carbon black, carbon fibers, etc, and therefore understanding the properties of graphene nanostructures could help us understand the properties of the more complex carbon and improve their functions. For these purposes, we have developed a solution-chemistry approach to making colloidal graphene quantum dots with well-defined structures. In my talk I will present our recent work to highlight the importance of the tight structural control and solution-processability of the graphene quantum dots in tuning and studying their properties for thermoelectrics and catalysis. We believe the graphene quantum dots could lead to novel, renewable uses of carbon for energy.