

MRSEC SEMINAR SERIES

“Synthesis Routes of Graphene to Preserve Its Material Properties”



Graphene is a 2D material with atomic thickness and possesses unusual thermal, electrical, optical, and mechanical properties. However, those predicted, or measured, material properties could be achieved only when graphene has low defects with controlled surrounding environments. In this presentation, I will introduce two major strategies of graphene synthesis from my group; non-oxidized graphene flakes from graphite through intercalation and chemical synthesis of graphene by CVD. For the CVD synthesis of graphene, our group has focused on developing new CVD systems that potentially separate nucleation from growth stages of graphene and some results shows the possibility of synthesizing large graphene domains with the better understanding of graphene growth mechanism. For the synthesis of graphene flakes from graphite intercalation compounds, we have developed various intercalation methods. Transparent electrodes achieved from the flakes that possess sheet resistance under 1 k Ω /sq as prepared at 80% transmission representatively prove the importance of synthesis route of graphene. Thermal composites, mechanical composites, graphene quantum dots, and various energy applications made from the flake type of graphene will be presented as evidences how we preserve graphene's fascinating material properties.

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