

Research towards new architecture based on 2D layered materials

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In this talk, we introduce our research activity towards new architecture based on 2D materials such as graphene and MoS<sub>2</sub>. First, we show that graphene or monolayer MoS<sub>2</sub> can be rolled up into nanoscroll structure, distinct from nanotube or 2D atomic layers. Properties of rolled-up graphene and MoS<sub>2</sub> were investigated. Secondly, we present the effect of laser irradiation on 2D monolayers. We observed the swelling-up of the monolayer from the SiO<sub>2</sub> substrate upon laser illumination. The mismatch in the thermal expansion between the substrate and 2D layers can result in the structural deformation. Employing this method, one can induce structural deformation in a desired pattern. We demonstrate the patterning of periodic ripples in monolayers by using laser irradiation. The new architecture and the strain engineering might provide a useful tool with enhancing the performance of electronic and optoelectronic devices based on 2D materials.