Synthesis of Two-imensional TMDC Janus Materials

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ABSTRACT

For fifteen years, graphene has gained a great interest amongst the materials community due to its fascinating properties. Lack of an intrinsic band gap in graphene has led to the design and development of other two-dimensional materials such as transition metal dichalcogenides (TMDCs), black phosphorous and hexagonal boron nitride (h-BN) due to their controllable band gap, unique mechanical and electronic properties. In the last three years, Janus materials have become very important. For a two-dimensional TMDC material in MX2 form, by replacing one of chalcogen layers with another one, Janus materials in MXY form can be obtained. MXY Janus structure exhibits extraordinary physical properties because of lack of an out of plane symmetry. Here, a novel Janus crystal synthesis approach based on plasma assisted chalcogen layer replacement was developed and overall results establish the fundamentals of synthesis with high quality MoSeS and WSeS Janus crystals.

BRIEF BIOGRAPHY

Dr. Turgut is Assoc. Professor at Department of Basic Sciences, Science Faculty, Erzurum Technical University, Turkey. He received his PhD from Ataturk University, Turkey and he completed his postdoctoral studies at Arizona State University, USA. His major research interests are two-dimensional materials, thin films, and semiconductor devices. He has published more than 60 articles and his works have been cited more than 1000.