Abstract Submitted
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Microwave Assisted 2D Materials Exfoliation YANBIN WANG, Univ of Maryland — Two-dimensional materials have emerged as extremely important materials with applications ranging from energy and environmental science to electronics and biology. Here we report our discovery of a universal, ultrafast, green, solvo-thermal technology for producing excellent-quality, few-layered nanosheets in liquid phase from well-known 2D materials such as such hexagonal boron nitride (h-BN), graphite, and MoS_2. We start by mixing the uniform bulk-layered material with a common organic solvent that matches its surface energy to reduce the van der Waals attractive interactions between the layers; next, the solutions are heated in a commercial microwave oven to overcome the energy barrier between bulk and few-layers states. We discovered the minutes-long rapid exfoliation process is highly temperature dependent, which requires precise thermal management to obtain high-quality inks. We hypothesize a possible mechanism of this proposed solvo-thermal process; our theory confirms the basis of this novel technique for exfoliation of high-quality, layered 2D materials by using an as yet unknown role of the solvent.

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