Mass Production of 2D Materials by Exfoliation and Their Applications

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Graphene and two-dimensional (2D) materials have attracted significant interest. So far, only graphene can be produced in ton level, while other 2D materials cannot, which is a key limiting factor for their commercial applications.
First, I will briefly introduce the invention of a green oxidation process to produce graphene oxide with high quality and efficiency in large quantity by oxygen radicals[1]. Then, I will report our recent achievements in mass production of various 2D materials, including hexagonal born nitride (h-BN), transition metal dichalcogenides (TMDCs), black phosphorene, layered complicated oxides, and others, by a new powerful technology which is called interMediate Assisted Grinding Exfoliation (the iMAGE technology) [2]. This method is among the most powerful and efficient methods to produce 2D materials with the highest yield, quality, and production rate. This method can also be used to produce 2D MoS2 flakes from cheap and abundant MoS2 minerals. Furthermore, I will introduce the mass production of functionalized 2D materials by mechanochemical exfoliation [3]. In the end, I will discuss the use of such massively produced 2D materials for energy storage and conversion, functional composites, sensors, and thermal management materials [4-6].

REFERENCES

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Short CV:
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