

Highly efficient exfoliation of black phosphorus into few-layer phosphorene via acoustic-microfluidic process

최창호, 김동표[†]

POSTECH

(dpkim@postech.ack.kr[†])

Few-layer black phosphorus (BP) with tunable band gap and excellent electronic properties is an emerging two dimensional semiconductor and expected to be useful in many applications. Here acoustic-microfluidic exfoliation suggests highly efficient production of few-layer BP flakes in few-minute operation, as compared to prolonged conventional bulk exfoliation. The dynamic continuous-flow enhanced intrinsic cavitation activity by induced shear forces at effective flow rate, which enables to efficiently exfoliate the BP chunk powder into thinly delaminated BP flakes. Phosphorene is known to be easily degraded under exposure to oxygen and water. The stability study of few-layer phosphorene is performed by using QCM, which offers quantitative degradation data of few-layer phosphorene.