

Abstract Submitted
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On demand generation of photoluminescence on thick MoS₂ flakes via laser thinning and gold nanoparticle self-assembly LILI GONG, CHORNG HAUR SOW, National University of Singapore — Recently, the photoluminescence (PL) property of monolayer and few layer transition metal dichalcogenides (TMDs) has aroused tremendous attention. However, the difficulty in synthesizing large area monolayer and few layer TMDs limits its application. Here we show that photoluminescent patterns with arbitrary shapes can be produced via a simple but effective method based on thick MoS₂ flakes. By scanning focused laser beam on thick MoS₂ flakes, few layer MoS₂ and thick edges can be fabricated arbitrarily. After the laser treated MoS₂ being immersed in AuCl₃ solution, gold nanoparticles are selectively grown on the few layer MoS₂ and thick edges where the particle size on edges (from 100nm to 400nm) are much larger than that on few layer MoS₂ (less than 150nm) The obtained PL spectra show that the PL intensity is largely enhanced (up to 20 fold) and an obvious blue shift can be observed after the gold growth. We also demonstrate that arbitrary fluorescent patterns can be produced by this laser thinning and gold deposition process.

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