Strain-Induced Spatial Isolation of Quantum Emitters in Bilayer MoS_2

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Abstract

Two-dimensional transition metal dichalcogenide crystals are intriguing hosts for quantum light sources due to their unique optoelectronic properties. Here, we report that strain gradients, generated by laser scribing of the substrate (fig. 1), result in spatially isolated quantum emitters in bilayer MoS_2. By correlating localized excitons with localized strain variations, we show that the I exciton intensity (~1.53 eV) is strongly enhanced (fig.2). This result raises the prospect of strain engineering quantum emitter properties and creating arrays of quantum emitters in bilayer MoS_2.

References

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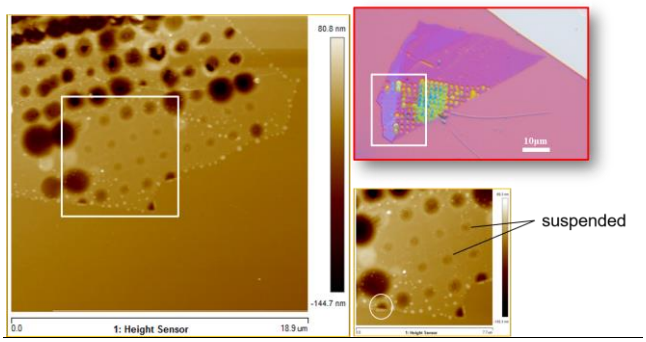

Figure 1: The bilayer MoS_2 produced by direct exfoliation on a thin PMMA layer spin coated onto SiO2. The array of holes was scribed by a 514 nm laser illuminating the bilayer crystal.

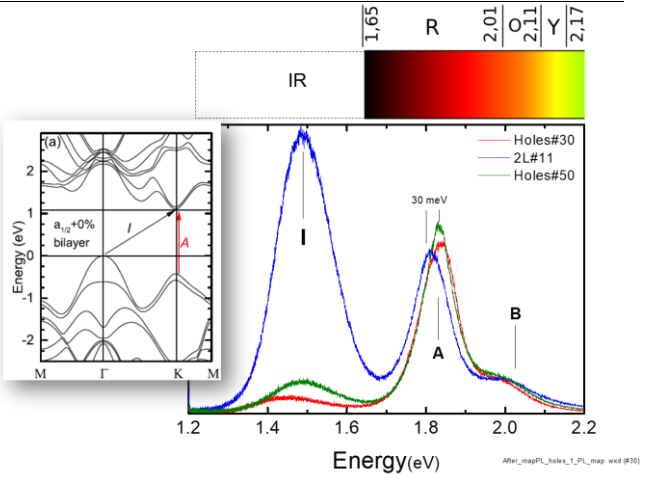

Figure 2: The photoluminescence spectrum of bilayer MoS2 before (red-green) and after laser scribing(blue).

Figures