Nano-micro domes produced in bulk transition metal dichalcogenides by proton irradiation

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In this talk, we present the effects of H irradiation in bulk transition metal dichalcogenides MX2 (with M transition metal and X calchogen). We found that, under suitable conditions, H alters dramatically the morphology of the sample surface, where atomically thin spherical domes form. The domes contain highly-pressurized H2 and emit light efficiently at room temperature. We demonstrate by lithographic approaches that the dome size and position can be precisely determined paving the way to the control of the optoelectronic and mechanical properties of two-dimensional (2D) materials over large, scalable regions.