Abstract Submitted
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Extraordinary room-temperature photoluminescence in WS_2 monolayers[1] HUMBERTO RODRIGUEZ GUTIERREZ, Department of Physics and Astronomy, University of Louisville, KY, NESTOR PEREA-LÓPEZ, ANA LAURA ELÍAS, AYSE BERKDEMIR, BEI WANG, RUITAO LV, FLORENTINO LÓPEZ-URÍAS, VINCENT CRESPI, HUMBERTO TERRONES, MAURICIO TERRONES, Department of Physics, The Pennsylvania State University, 2-D LAYERED MATERIALS MURI 24 COLLABORATION — Individual monolayers of metal dichalcogenides are atomically thin two-dimensional crystals with attractive physical properties different from their bulk layered counterpart. Here we describe the direct synthesis of WS_2 monolayers with triangular morphologies and strong room-temperature photoluminescence (PL). The Raman response as well as the luminescence as a function of the number of S-W-S layers is also reported. The PL becomes weaker with the increase of S-W-S layers number due to a transition from direct (in a monolayer) to indirect band gap (in multilayers). The edges of WS_2 monolayers exhibit PL signals with extraordinary intensity, around 25 times stronger than the platelets center. The structure and composition of the platelet edges appear to be critical for the PL enhancement effect. These novel 2D nanoscale light sources could find diverse applications including the fabrication of flexible/transparent/low-energy optoelectronic devices

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