

Abstract Submitted
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Focused helium-ion beam irradiation effects on electrical properties of multi-layer WSe₂ PUSHPA RAJ PUDASAINI, MICHAEL STANFORD, NICK CROSS, GERD DUSCHER, DAVID MANDRUS¹, PHILIP RACK², The University of Tennessee — Atomically thin transition metal dichalcogenides (TMDs) are currently receiving great attention due to their excellent opto-electronic properties. Tuning optical and electrical properties of mono and few layers TMDs, such as Tungsten diselenide (WSe₂), by controlling the defects, is an intriguing opportunity to fabricate the next generation opto-electronic devices. Here, we report the effects of focused helium ion beam irradiation on structural, optical and electrical properties of few layer WSe₂, via high resolution scanning transmission electron microscopy, Raman spectroscopy and electrical measurements. By controlling the ion irradiation dose, we selectively introduced precise defects in few layer WSe₂ thereby locally tuning the electrical resistivity of the material. Hole transport in the few layer WSe₂ is severely affected compared to electron transport for the same dose of helium ion beam irradiation studied. Furthermore, by selectively exposing the ion beams, we demonstrate the lateral p-n junction in few layer WSe₂ flakes, which constitute an important advance towards two dimensional opto-electronic devices.

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