

**Ankur Nipane<sup>1</sup>**

Minsup Choi<sup>1,2</sup>, Punnu Jose Sebastian<sup>1</sup>, Abhinandan Borah<sup>1</sup>, Younghun Jung<sup>1</sup>,  
Won Jong Yoo<sup>2</sup>, James Hone<sup>1</sup>, and James T. Teherani<sup>1</sup>

<sup>1</sup>Columbia University, New York, USA

<sup>2</sup>Sungkyunkwan University, Suwon, South Korea

[ankur.nipane@columbia.edu](mailto:ankur.nipane@columbia.edu)

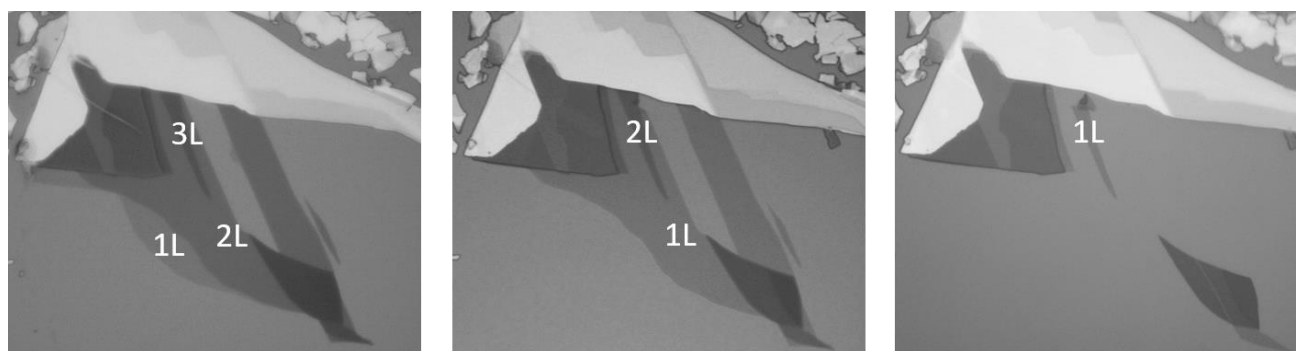
## Damage-free Atomic-layer Etch of WSe<sub>2</sub>

In this work, we demonstrate a novel room-temperature atomic layer etching process that produces high-quality flakes of desired thickness. The electrical and optical properties of the etched layers are shown to be comparable to that of pristine exfoliated flakes of similar thickness.

### References

- [1] A Nipane, P. J. Sebastian, Y. Jung, M. Choi, A. Borah, W. J. Yoo, J. Hone, and J. T. Teherani, *Device Research Conference*, DRC 2019

### Figures



as exfoliated  
(pristine)

after 1<sup>st</sup> cycle of  
oxidation + etching

after 2<sup>nd</sup> cycle of  
oxidation + etching

**Figure 1:** Optical images show clear demonstration of repeatable atomic-layer etching with monolayer precision