

# Synthesis and Characterization of V-doped WTe<sub>2</sub> Nanolayers

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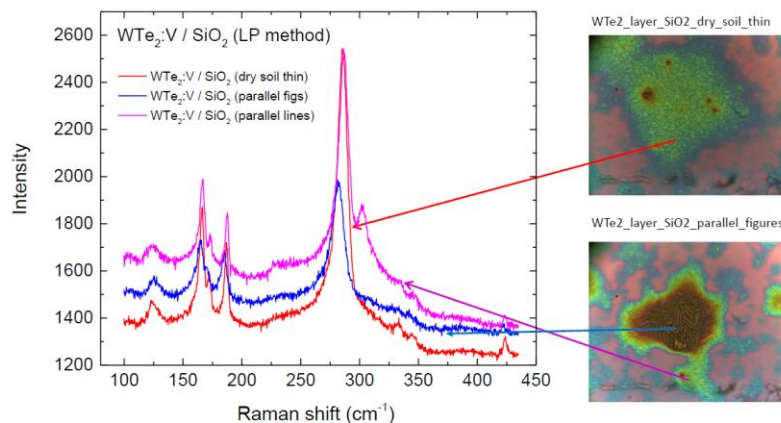
## Abstract

The discovery of 2D topological insulator in monolayer 1T'-WTe<sub>2</sub> indicates great potential for novel electronic, spintronic, and quantum metrology. Theoretically, the interaction between the topological states and the magnetic ordered states of Td-WTe<sub>2</sub> enables the modulation of Weyl semimetal states by an external magnetic field and potentially the creation of a quantum anomalous Hall phase [1]. However, currently, ferromagnetism in layered 1T'-WTe<sub>2</sub> is still not observed. We are attempting to synthesize nanolayers/flakes of 1T'-WTe<sub>2</sub> with vanadium doping in order to induce magnetism. V-doped WTe<sub>2</sub> nanolayers/flakes were synthesized in an atmospheric pressure CVD (APCVD) quartz tube reactor with three independent thermal zones. LP (liquid precursors) method based on ammonium metatungstate hydrate (AMT) and ammonium metavanadate (AMV) or vanadium(IV) oxide sulfate (VOSO<sub>4</sub>) with addition of PTAS was used for the synthesis. The obtained nanolayers/clusters/flakes were studied by optical microscopy and Raman spectroscopy.

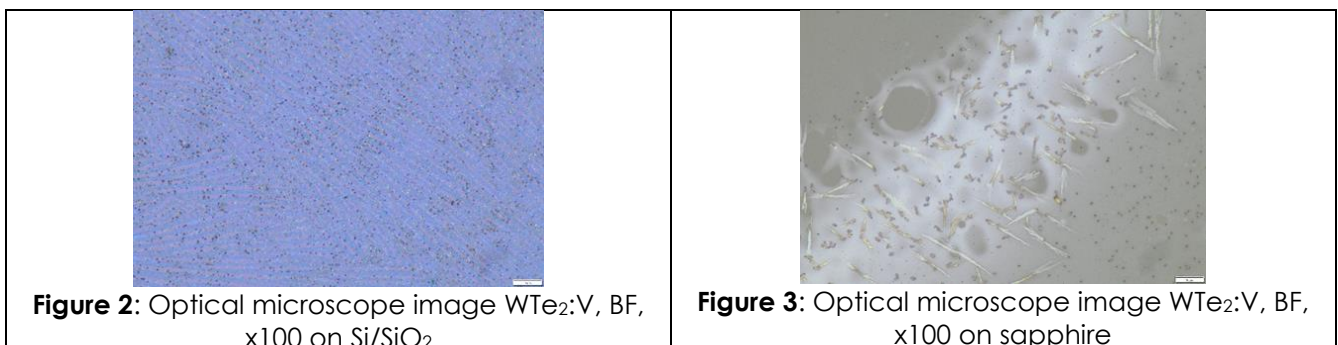
## References

- [1] E. Liu et al., Nat. Phys. 14 (2018)

## Figures



**Figure 1:** Raman analysis of different flakes spots taken when using AMT and AMV with PTAS salt for APCVD synthesis of V-doped WTe<sub>2</sub> nanolayers



**Figure 2:** Optical microscope image WTe<sub>2</sub>:V, BF, x100 on Si/SiO<sub>2</sub>

**Figure 3:** Optical microscope image WTe<sub>2</sub>:V, BF, x100 on sapphire