# Liquid Precursor Assisted CVD Synthesis of Vanadium Doped $WTe_2$

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Abstract

The liquid-assisted growth and doping of TMDCs involve using a metal salt aqueous solution or a metal suspension directly spun on the substrate. Compared with traditional CVD (Chemical Vapor Deposition), the spin-coating precursor-mediated CVD technique offers great flexibility in achieving controllable transition metal-doped TMDCs. The utilization of mixed precursor solutions enables the tunability of doping concentrations for various dopants in different host materials, resulting in adjustable electrical, optoelectronic, catalytic, and magnetic properties of TMDCs beyond their intrinsic characteristics [1, 2]. In our study, V-doped $WTe_2$ nanolayers/flakes were synthesized using an atmospheric pressure CVD quartz tube reactor equipped with three independent thermal zones. Spin-coated ammonium meta tungstate (AMT) and ammonium metavanadate (AMV), $NH_4VO$ or vanadium (IV) oxide sulphate ($VOSO_4$), were employed as tungsten and vanadium precursor liquid sources, respectively, with the addition of PTAS as a nucleation promoter. The resulting nanolayers/clusters/flakes were analysed using Raman spectroscopy. Optical microscope observations revealed flakes/clusters with two different morphologies, while Raman spectra exhibited similar mode patterns.

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References

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[1] Shen, D. et al., Precision Chemistry, xxx (2024) xxx-in press.

Figures

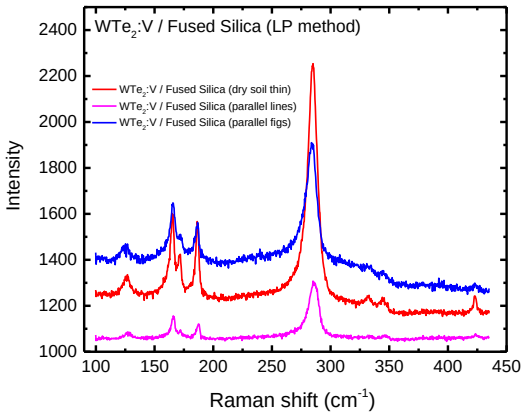


**Figure 1:** Raman analysis of different flakes spots taken when using AMT and AMV with PTAS for APCVD synthesis of V -doped $WTe_2$ nanolayers.