Crystal Growth and Characterization of Vanadium-Doped WTe_2

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Abstract
The Weyl semimetal and topological insulator behaviors of the van der Waals layered Td-WTe_2 have garnered significant research attention. In this context, ferromagnetism in the layered Td-WTe_2 is crucial for realizing a quantum anomalous Hall effect [1] and exerting magnetic control over its Weyl or topological phase [2]. However, releasing this control remains a persistent challenge. Substitutional doping with magnetic element is one possible way to induce ferromagnetism in WTe_2. In this study, single crystals of vanadium-doped WTe_2 were synthesized using both the Chemical Vapor Transport (CVT) method with Br_2 as a transport agent and the self-flux crystal growth technique employing tellurium as a flux. The orthorhombic Td structure of WTe_2 was confirmed through single crystal and powder X-ray diffraction. Additionally, Raman spectroscopy analyses further verified the structure. The layered morphology, elemental composition stoichiometry, and vanadium doping were confirmed through TEM, XPS and EDS, respectively.

Acknowledgment: We acknowledge the support of the European Union's Horizon 2020 FET-PROACTIVE project TOCHA under Grant No. 824140.

References

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Figures

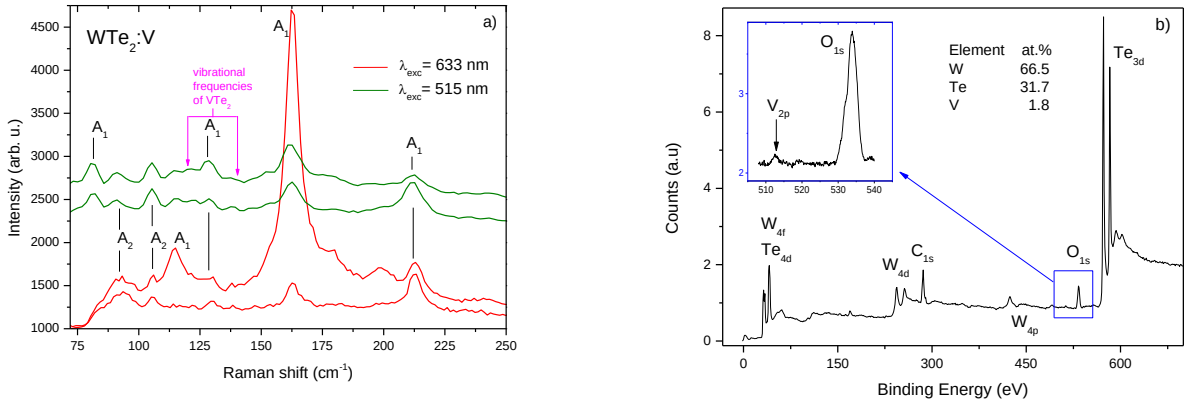

Figure 1: a) Raman spectroscopy and b) XPS of vanadium doped WTe_2 crystal