Atomic Force Microscopy and Image Analysis of Epitaxial 2D Tungsten Disulfide Crystals Grown via MOCVD

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This abstract presents recent advancements in the utilization of Atomic force microscopy (AFM) and image analysis techniques to investigate the morphology and structure of epitaxial 2D tungsten disulfide crystals (WS_2) grown on sapphire wafers using the metal-organic chemical vapour deposition (MOCVD) process.

The high-resolution AFM imaging enables the observation of the structure of the developed material at different temperatures, providing detailed information about its quality, including defects, grain boundaries, and layer thickness. Furthermore, ImageJ was used as an image analysis algorithm to extract quantitative data on the size, shape, and orientation of 2D crystals, as well as the mapping of their electronic and optical properties. By interpreting intricate details at the nanoscale level, combining these image analysis techniques offers valuable comprehension for fundamental research and practical applications.

Additionally, improving the accuracy and reliability of data extraction algorithms is crucial for further advancing our understanding of epitaxial 2D tungsten disulfide crystals grown using MOCVD. The abstract concludes by outlining some of the remaining challenges and opportunities for future research in this field.

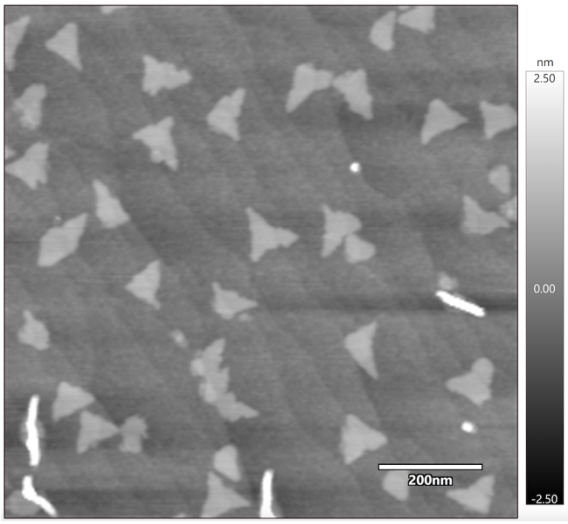

Fig. 1 Atomic force microscopy image showing nucleation growth of tungsten disulfide monolayers on sapphire wafer at 750C