

Abstract Submitted
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Imaging the grain boundaries in polycrystalline MoS₂ monolayer by non-invasive second harmonic generation JINXIN CHENG, TAO JIANG, Fudan University, QINGQING JI, YANFENG ZHANG, Peking University, XINGAO GONG, WEI-TAO LIU, SHIWEI WU, Fudan University — Atomically thin transition metal dichalcogenide monolayers have showed intriguing physical properties for high performance quantum electronics. In order to utilize them in technological applications at industrial scale, mass production of this two dimensional materials via chemical vapor deposition (CVD) is demanded and urged. Despite the success of growing large-scale monolayer, limited grain size and emergence of grain boundary remain as the major hurdle being single crystalline sheets. To resolve this issue, it is necessary to image the grain and grain boundary, and further understand their formation with statistical significance. Here we used second harmonic generation (SHG) microscopy, a noninvasive coherent imaging technique, to image the grain and grain boundary in CVD grown monolayer molybdenum disulfide. The destructive interference between neighboring grains enabled us to pinpoint the location of grain boundary; the anisotropic polarization pattern permitted us to determine the type of grain boundary. Furthermore, this high-throughput characterization technique allows statistical analysis of hundreds of grain and grain boundary, unambiguously revealing that the CVD growth mechanism of monolayer MoS₂.

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