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Characterization of Laser Thinned Molybdenum Disulfide Nano Sheets ABDULLAH ALRASHEED, First Author and main researcher, NOURAH ALRUBAIQ, FADHEL ALSAFFAR, KOO-HYUN CHUNG, co author, FRANK DELRIO, MOH. R. AMER, principal investigator — Transition Metals Dichalcogenide (TMDC) materials have attracted the scientific community due to their unique optical, mechanical, and electronic properties. Molybdenum disulfide (MoS_2), an emerging 2D material, exhibit a tunable band gap that strongly depends on the numbers of layers, which makes MoS_2 an attractive candidate for optoelectronic applications. However, recent reports have shown that engineering a monolayer using laser thinning can be an effective method without oxide formation, which can be a promising technique for various applications. Here, we investigate this laser thinning process using Raman spectroscopy, -XPS, and AFM measurements. Our results show that laser thinned MoS_2 exhibit a large oxide on the surface of the flake. This oxide cannot be detected using -Raman spectroscopy, contrary to -XPS and AFM measurements. We also show that monolayer MoS_2 exhibit distinctive phonon behavior compared to multilayer MoS_2, which is readily reflected on the vibrational modes intensities. Our results shed light on the topology of laser thinned MoS_2 flakes for future optoelectronic and electronic applications.

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