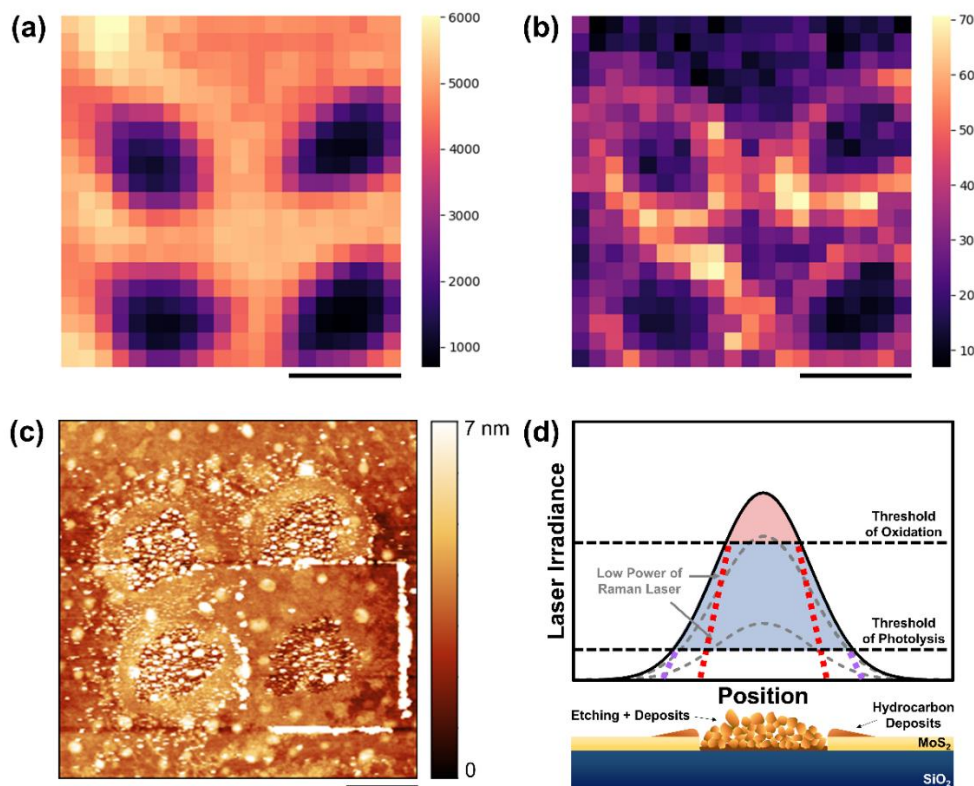


# A Comprehensive Investigation of Raman Laser-Induced Structural Modification in CVD-Grown Monolayer MoS<sub>2</sub>

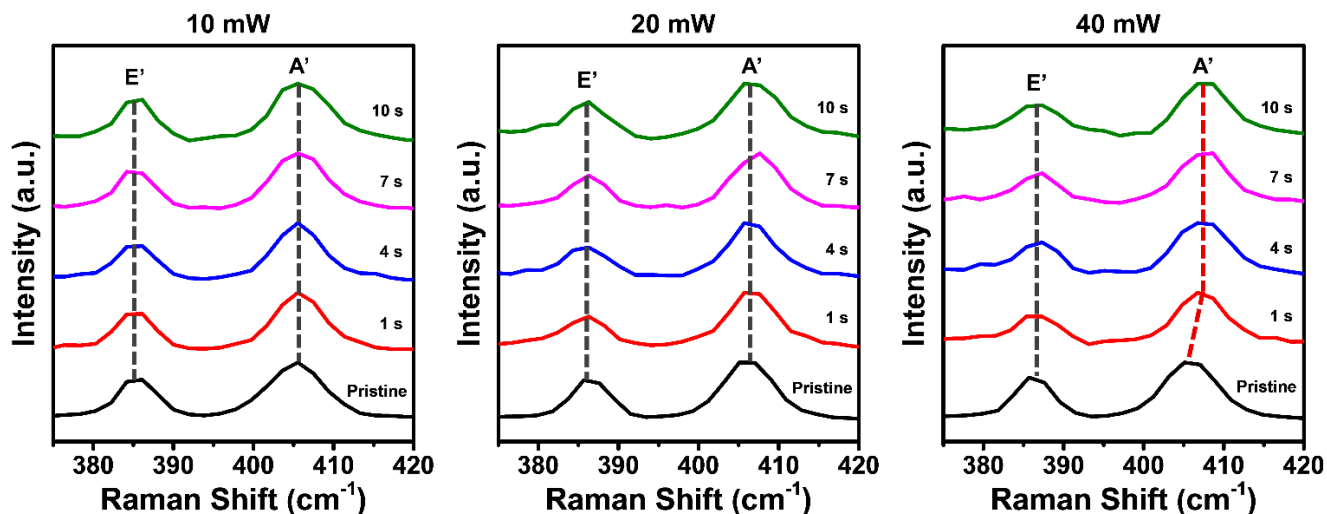
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**Figure S1.** Effect of laser irradiation on monolayer MoS<sub>2</sub>. (a) Raman intensity mapping image at A' vibration mode. (b) Raman intensity mapping image at the hydrogenated amorphous carbon (a:C-H) peak. The scale bars represent 1  $\mu$ m. (c) AFM topography image of (a) and (b) with part of the laser spot scratched. (d) Schematic illustration depicting the effects on monolayer MoS<sub>2</sub> relative to the spatial distribution of the laser intensity and its interaction with the sample.



**Figure S2.** Raman spectra of E' and A' vibration modes in the range of 375~420  $\text{cm}^{-1}$  according to the power and exposure time. The spectra are normalized to the A' vibration mode. The A' vibration mode exhibits a slight blue-shift ( $\sim 407 \text{ cm}^{-1}$ ) at a laser power of 40 mW.

**Table S1.** Calculated maximum temperature of the top surface of the Si substrate according to the laser power.

		10.37 mW	20.14 mW	40.48 mW	51.82 mW
D	( $\mu\text{m}$ )	0.74	0.74	0.74	0.74
$q''_{\text{laser, average}}$	( $\text{W}/\text{cm}^2$ )	$2.41 \times 10^6$	$4.68 \times 10^6$	$9.41 \times 10^6$	$1.29 \times 10^7$
$T_{\text{Si, top, max}}$	(K)	373.19	443.89	591.08	673.15
	( $^{\circ}\text{C}$ )	100.04	170.74	317.93	400.00