

Abstract Submitted
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Intervalley double resonance processes in MoS₂ YUANXI WANG, Pennsylvania State University, BRUNO CARVALHO, LEANDRO MALARD, CRISTIANO FANTINI, Universidade Federal de Minas Gerais, VINCENT CRESPI, Pennsylvania State University, MARCOS PIMENTA, Universidade Federal de Minas Gerais — Intervalley scattering plays a significant role in electronic energy dissipation in semiconductors. We investigate the intervalley scattering of monolayer and few-layer MoS₂, by combining density functional theory calculations and resonant Raman spectroscopy probed by up to 20 laser excitation energies. We observe that two Raman peaks within 420-460 cm⁻¹ are dispersive over a small range of laser energy, a clear signature of second-order processes involving intervalley scattering. Both modes involve LA and TA phonons at or near the K point. A third Raman peak at 466 cm⁻¹ shows a strong intensity dependence on the layer number and is assigned 2LA(M). Our results invalidate previous Raman peak assignment proposals and open up a better understanding of double resonance processes in transition metal dichalcogenides.

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