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Annealing and ionic liquid gating on suspended molybdenum disulfide devices FENGLIN WANG, PETR STEPANOV, MASON GRAY, MIKHAIL ITKIS, ROBERT HADDON, CHUN NING LAU, University of California Riverside — We fabricate suspended molybdenum disulfide (MoS_2) field effect transistors (FET) devices and develop an effective gas annealing technique that significantly improves device quality and increases conductance by 3-4 orders of magnitude. Temperature dependence measurements reveal two transport mechanisms: electron-phonon scattering at high temperatures and thermal activation over a gate-tunable barrier height at low temperatures. Our results suggest that transport in these devices is not limited by the substrates. Moreover, this suspended MoS_2 device structure provides double surface access for ionic liquid gating. We are able to extract the dielectric constant of the ionic liquid, and the latest experimental results will be presented.

Fenglin Wang
University of California Riverside

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