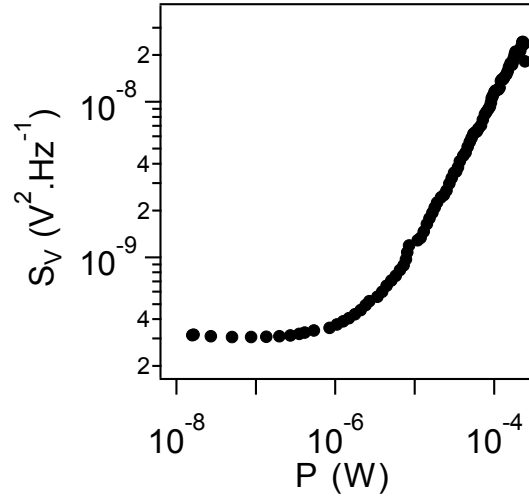


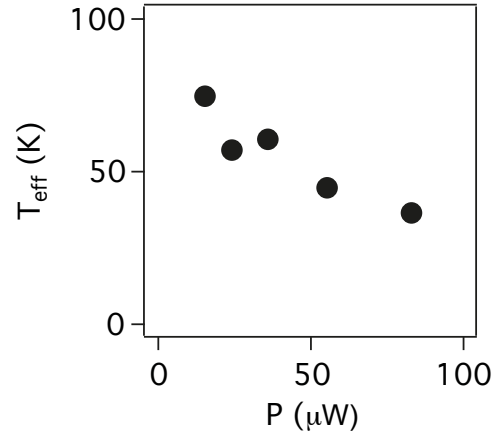
High quality-factor mechanical resonators based on WSe₂ monolayers: Supplementary Information

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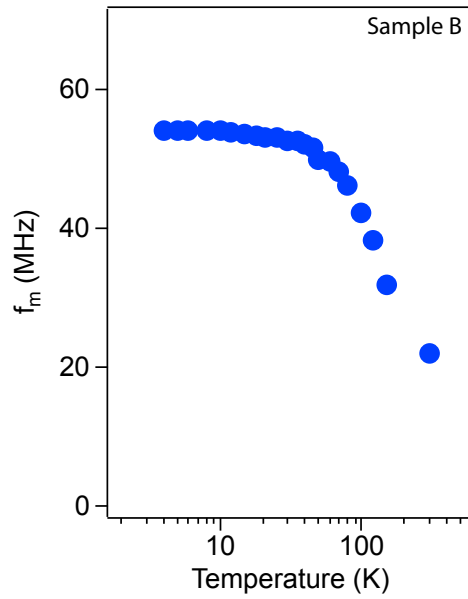
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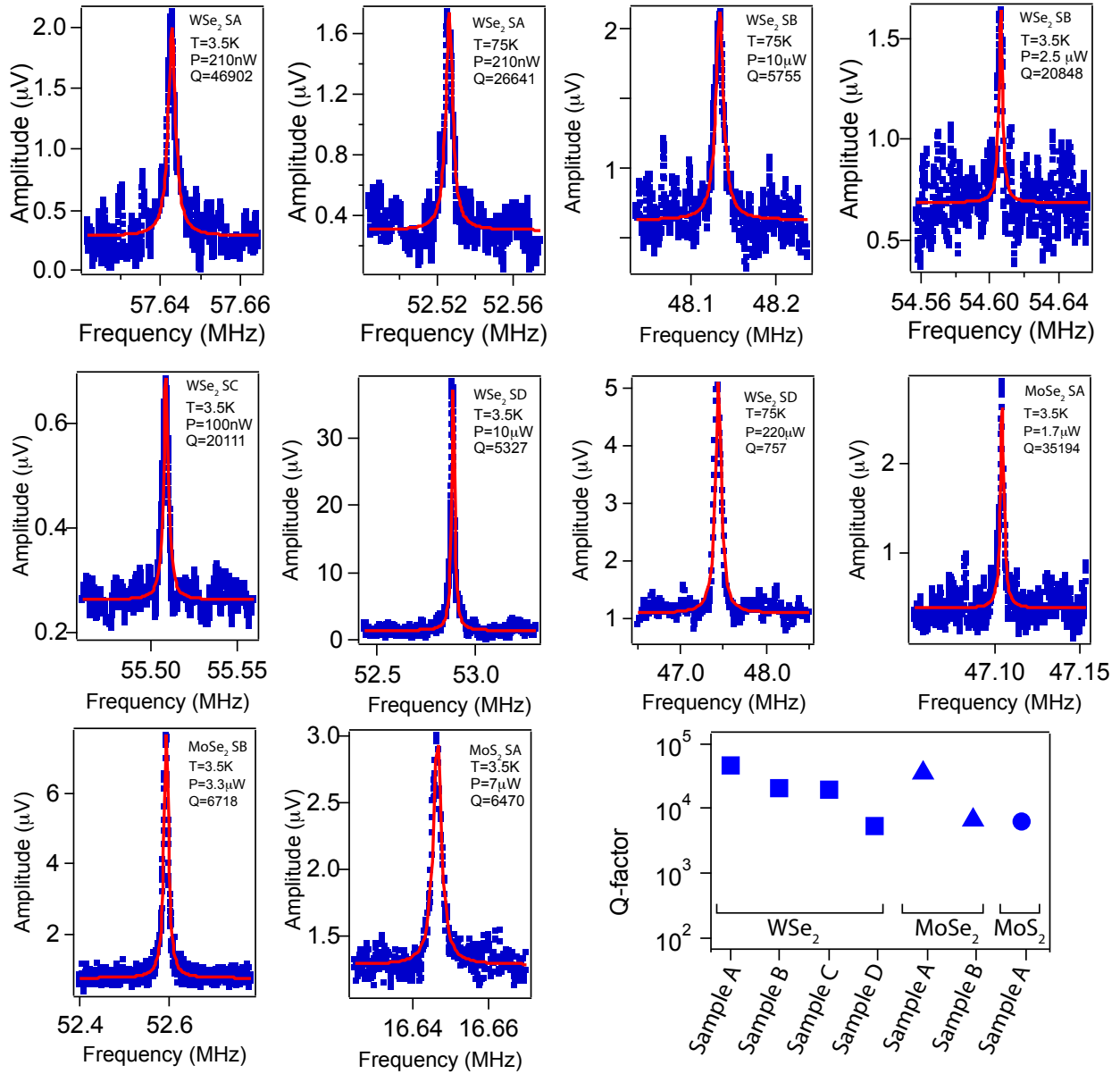
Supplementary Figure 1. Power spectral density of the avalanche photodiode (APD) output S_V as a function of the laser power P . The laser spot is focused on the substrate, near the drum. For each value of P the noise level at 30 MHz is recorded over a bandwidth of 1 kHz. The power dependence of S_V at high laser power can be described by a power law with the exponent equal to one, in agreement with the noise level limited by the shot noise of the laser source. At low laser power, S_V is independent of P , indicating that the sensitivity is limited by the intrinsic electronic noise of the APD.



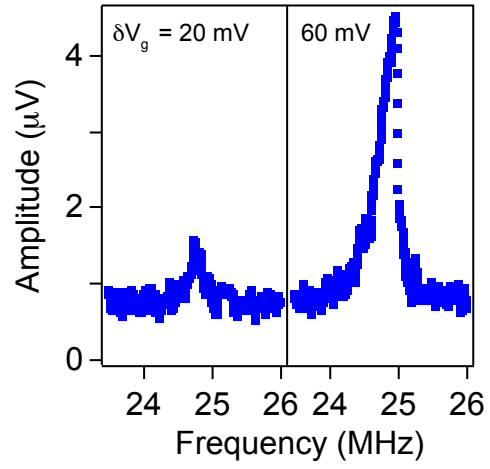
Supplementary Figure 2. Effective temperature T_{eff} of the fundamental mechanical mode as a function of the laser probe power measured with the cryostat temperature set at 75K. T_{eff} is extracted by fitting the thermal resonance in the noise spectrum, as described in the main text. As the laser power increases, the mechanical mode cools down through dynamical photothermal back-action.



Supplementary Figure 3. Mechanical resonant frequency f_m as a function of cryostat temperature for sample B.



Supplementary Figure 4. Collection of mechanical spectra for WSe₂, MoSe₂ and MoS₂ monolayer nano resonators. Samples A and B corresponds to the ones shown in the main text.



Supplementary Figure 5. Response of a monolayer WSe_2 mechanical resonator to an oscillation force at 300K. The response is nonlinear at high drive voltage (right panel).