Site-controlled and energy-tuneable single-photon sources in two-dimensional materials

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The appearance of single-photon sources in 2-dimensional materials, such as transition metal dichalcogenides (TMD), holds great promises for the development of flexible and ultra-compact quantum technology. Despite the physical origin of these quantum emitters is still under debate, it has been recently shown that elastic strain engineering can be used (*i*) to induce the formation of ensembles of site-controlled single photon sources [1][2], and (*ii*) to control their emission properties [3], [4]. Here [5], we bring together these two features of strain in TMDs to fabricate arrays of energy-tuneable and site-controlled single photon sources. To do so, we transferred single layer of WSe_2 onto nano-pillars made of piezoelectric material. Micro-photoluminescence spectroscopy performed at low temperature reveal a complex evolution of the intensities of different localized excitons with the voltage applied to the piezoelectric pillar. As these changes come without affecting the overall integrated intensity, our results suggest that external strain can be used to dynamically control the population of the different localized excitons in TMDs, an important step towards the understanding of their physical origin and the key to deterministically control their formation.

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