Electroluminescent Γ point interlayer excitons

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Assembling semiconductors in type-II interfaces is promising for optoelectronics as the spectral response of the interlayer excitons can be tailored over a broad range by changing the constituents of the heterostructure. Recent works have shown that engineering van der Waals (vdW) heterostructures based on crystals that have the bottom of the conduction band and the top of the valence band at the Γ point provide a robust method to tune photoluminescence at various energies depending on the constituents and their thicknesses [1]. Here we fabricated and investigated the first electrical devices of this type of interfaces (*i.e.* InSe/TMD bilayer). By operating the devices such that a *p-i-n* junction forms in the interfacial channel, we observe bright electroluminescence (EL) from interlayer excitons. By tuning the voltage across the interface we are able to modulate the emission energy of the EL over several hundreds of meV. This illustrates that tailored vdW interfaces provide a very attractive platform for tunable radiation sources that cover a very broad frequency spectrum as well as for the study of excitonic dynamic [2–4].

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