MAPPING THE OPTICAL EXCITATIONS WITH ELECTRON BEAMS

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Van der Waals materials have enabled an exquisite platform for exploring light-matter interactions at the nanoscale. Various forms of van der Waals materials have enabled the observation of strong-coupling effects, in the form of exciton-polaritons, in either a self-hybridized form or in combination with photonic cavities. Here, I will elaborate on the interaction between free electrons and thin films of van der Waals materials, and will show how electron beams can probe self-hybridized exciton-polaritons in transition metal dichalcogenide thin films [1], and describe through a sequential cathodoluminescence spectroscopy technique the formation of a coherent cathodoluminescence radiation from exciton polaritons as well as their decoherence time scale [2]. I will also discuss how exciton-plasmon interactions can be leveraged to control the band structure of a plasmonic crystal [3]. In addition, the formation of exciton polaritons in perovskites [4], hyperbolic exciton polaritons in Bi_2Se_3 [5], and hyperbolic plasmon-polaritons in borophene films [6] will be discussed and explored with electron beams.

References:

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