Observation of Momentum Forbidden G-K Exciton in a $Mos_2/CrCl_3$ Heterostructure

Susmita Jana[1]

[1] *Department of Physics, Indian Institute of Technology Madras, Chennai-600036, India*

Hybrid excitons in a type-II magnetic-nonmagnetic van der Waals heterostructure are the foundation to examine magnetic proximity interactions leading to significant interlayer coupling and emergent quasiparticles in these materials. Such excitons are being observed at a lower energy spectrum than their constituent parent materials due to electronic band offset and magnetism induced high coulomb interaction. Here we are presenting nontrivial approach to observe momentum forbidden Γ-K hybrid exciton with comparable PL intensity in a planar magnetic substrate and MoS_2 monolayer. We have thoroughly investigated the role of band hybridization involved in this process. The optical hybridization opens a new way by modifying the spin textures and breaking the symmetry at the interface which will offer a gateway for this material to use in various spin and optoelectronic devices. We found zero polarization of this Γ-K hybrid exciton contributing to the involvement of Γ and K valley and extended lifetime of this exciton provide validation towards its momentum dark nature. Further through the lifetime calculations, we have demonstrated that this newly formed state is the energetically most favourable state than the conventional K-K exciton. This interfacial engineering approach facilitates a new degree of control for studying correlated excitonic phenomenon in two dimensional heterostructures.