Title:

Quantum Dots Engineering for Overcoming the Light Outcoupling Efficiency Limit

Abstract:

Colloidal quantum dots (QDs) are emerging as one of the most promising candidates for next-generation photonic sources because of their scalability, cost effectiveness, emission color purity, and tunable chromaticity. However, when depositing QDs on transparent glass substrates, their intrinsic light outcoupling efficiency remains considerably lower than the organic counterpart, because it is not yet possible to control the transition-dipole-moment (TDM) orientation in QD solids at device level. In this talk, I will present fundamental principles governing the TDM orientation in QD solids. Using perovskite QD system as an example, I will show how the quantum-mechanical energy splitting upon confinement and emission polarization in individual QD could rescale the radiation from horizontal and vertical transition dipoles, effectively regulating the TDM orientation. Horizontal TDM orientation could allow us to extract more light in their light-emitting diode devices, enhancing the theoretical light outcoupling efficiency of greater than 30%. In addition to my research, I will also be happy to discuss with the students about studying in Switzerland and Europe in general.