

Molecular and Nanoscale Emitters – Photophysics, Photoluminescence Quantum Yields, and Surface Chemistry

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Inorganic nanocrystals such as spectrally shifting lanthanide-based nanoparticles (LnNCs) like NaYF₄: Yb, Er and semiconductor quantum dots, organic and inorganic particles stained with sensor molecules, and organic dyes showing aggregation-induced emission are meanwhile broadly applied in the life and material sciences. The identification of optimum particle architectures and molecular structures for photonic applications requires quantitative spectroscopic studies and methods to control and analyse particle surface chemistry. In the following, photoluminescence studies of different emitter classes are presented, thereby addressing the measurement of particle brightness and photoluminescence quantum yields in different spectral windows parameters required for an in-depth mechanistic understanding. In addition, examples for the quantification of surface functional groups on nanomaterials with optical spectroscopy are given.