

Abstract

This work addresses the problem of radiationless transport of electronic excitation energy in nanoscale systems of confined volume. An analytical model describing donor fluorescence intensity was proposed, initially for spherical systems in which energy transfer occurs according to the Förster mechanism of dipole-dipole interaction, and subsequently for cases involving energy migration within an ensemble of donors attached to the surface of a sphere. Further consideration was given to systems in which both migration and transfer of electronic excitation energy are possible, with molecules incorporated within the shell of spherical core-shell structures. The study was then extended to investigate energy transfer and migration processes in systems exhibiting cylindrical symmetry. The proposed models were validated using Monte Carlo simulations. The presented research aims to partially bridge the existing gap in the theoretical description of energy transport phenomena at the nanoscale in confined systems of well-defined geometry.