INFLUENCE OF LOCAL FIELD ON SPONTANEOUS LIGHT EMISSION BY NANOPARTICLES

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S u m m a r y

A self-consistent approach based on the local-field concept has been proposed to calculate the direction patterns of light emission by nanoparticles with various shapes. The main idea of the method consists in constructing self-consistent equations for the electromagnetic field at any point of the system. The solution of the equations brings about relationships between the local field at an arbitrary point in the system and the external long-wave field via the local-field factor. The latter connects the initial moment of optical dipole transition per system volume unit and the effective dipole moment of transition that takes local-field effects into account. The effective dipole moment depends on the particle shape and size. Therefore, dipole radiation depends on those parameters too. The direction patterns of light emission by cubic particles have been calculated. The particles have been demonstrated to interact as almost point dipoles at distances that exceed their linear dimensions. This fact can be used to substantiate applications of the dipole approximation to studying the optical properties of submonolayer molecular coatings.