

A GENERALIZATION OF THE MIE THEORY
FOR A SPHERE WITH SPATIALLY
DISPERSIVE PERMITTIVITY

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S u m m a r y

The Mie theory is generalized to the case of a sphere with spatially dispersive permittivity with regard for longitudinal electromagnetic waves and transverse ones with a single-valued dependence of the wavenumber on the frequency. The generalized Mie coefficients are determined with the help of the method of additional boundary conditions using the condition of electron opacity of the surface. The theory is applicable for the modeling of optical processes involving metals, does not require to simplify the dependence of the permittivity on the light frequency and wavenumber, and does not apply the electrostatic approximation. A relative error of this approximation in calculating the extinction cross-section of a 10 nm-radius silver sphere is shown to exceed 50% in a wide frequency interval.