P75a Light scattering properties of irregularly shaped particles of core-mantle structure

○ Evgenij Zubko、木村 宏、山本哲生（北海道大学、低温科学研究所）

We study scattering of light by irregularly shaped core-mantle particles whose sizes are comparable with wavelength. This kind of particles is considered as a realistic model of dust in protoplanetary disks and in comets of the Solar System. Thus a study of cometary dust could help us to understand the nature of cosmic dust. With the help of Discrete-Dipole Approximation (DDA), we simulate numerically light scattering by a particle of a silicate core and an organic mantle. We take the refractive index for the silicate core to be m=1.66+0.0028i and m=1.5+0.1i for the organic mantle.

We study the dependence of the intensity and the degree of linear polarization of the particles on the ratio of core to mantle volumes. We find that, while this ratio has been varied from 1:0.5 to 1:3, the core-mantle particles produce an enhancement of the intensity and negative polarization at backscattering. This agrees qualitatively with observations of comets. In addition, we study the influence of an outermost ice-shell (refractive index m=1.313+0i) attached to core-mantle particles of irregular shape on the light-scattering properties of a single core-mantle particle. We find that the ice-shell more enhances backscattering and negative polarization branch at small phase angles. We discuss the implications of the results on the evolution of the structure and composition of dust in cometary comae and in protoplanetary disks.