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Scattering Properties of Aggregate Particles

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We are engaged in modeling the scattering and emitting properties of irregular particles with the goal of understanding the composition and structure of cometary dust particles. Our numerical code is based on the discrete dipole approximation, in which a particle is modeled as an array of radiating dipoles on a three-dimensional lattice (Draine *ApJ* **333**, 848, 1988). Some of the optical properties of an aggregate particle are determined by the optical properties of the monomers (West *Appl Opt* **30**, 5316, 1991). Spherical monomers do not reproduce the observed cometary features; moreover, spurious resonances are introduced. We are creating aggregates composed of non-spherical monomers of differing sizes and optical properties. In particular, tetrahedral monomers do give rise to the 11.25 μm olivine emission peak observed in comets, as well as the negative polarization at small phase angles for size parameter $X \gtrsim 3$. Results on the single scattering albedo, polarization, and shape of the 10 μm silicate emission feature for these aggregates will be presented.

This research was carried out at the Jet Propulsion Laboratory, California Institute of Technology, under contract with NASA.

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