

Modeling Cometary Mid-Infrared spectra: Grain Properties of Comets

Takafumi Ootsubo[1]; Jun-ichi Watanabe[2]; Hideyo Kawakita[3]; Mitsuhiro Honda[4]; Reiko Furusho[5]

[1] Graduate School of Science, Nagoya University; [2] PR Center, Nat.Astron. Obs. Japan; [3] Gunma Astronomical Observatory; [4] Department of Astronomy, University of Tokyo; [5] ADAC, NAOJ

Comets are believed to be the most pristine remnants from the early solar nebula era of dust grain formation. These early grain formation processes are important in understanding how dust grain in the solar nebula condensed. By determining the precise mineralogical composition (especially amorphous-to-crystalline silicate ratio) and properties of grains in cometary comae, we can directly assess the origin of dust grains incorporated into the small, icy bodies of the solar system, and constrain solar nebula models.

The shape and relative strength of the IR emission from a grain is dependent on the intrinsic properties of the dust (shape, porosity, size and composition), as well as the temperature of the grain. Many models were assuming a single, identical temperature for dust grains. Harker et al. (2002) constructed the cometary grain model by assuming that the cometary dust of each size and composition is in radiative equilibrium with solar radiation field separately. We also use this model in analysis and compare it to other models, and discuss about the temperature of the crystalline silicate and amorphous-to-crystalline silicate ratio.

We carried out a low spectral observations (R-250) of comet C/2002 V1(NEAT), and of C/2001 Q4(NEAT) at 10 micron band. We present the detailed results of our analysis including model fitting, and compare with other results of C/2001 Q4(NEAT) at different heliocentric distance by Wooden et al. (2004).