Cool Crystallization of Cometary Silicate Dust

Tetsuo Yamamoto[1]; Takeshi Chigai[2]

[1] Earth and Planetary Sci., Nagoya Univ; [2] Earth and Planetary Sci., Nagoya Univ.

We propose a mechanism of crystallization of cometary silicate grains based on the Greenberg model of cometary dust, which is composed of a silicate core, an organic mantle, and an outermost icy mantle. The mechanism that we propose is crystallization due to energy release by chemical reactions of reactive molecules in the organic mantle when the grains released from a cometary nucleus are heated by solar radiation. We formulate the crystallization mechanism and calculate the degree of crystallinity of the silicate core. It is shown that the present mechanism will work and can reproduce the observed infrared spectra of the cometary crystalline silicate feature.