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Interpretation of the Crystalline/Amorphous Silicates Ratio

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The crystalline/amorphous silicate ratio(hereafter, CAR) in the ejecta of the Deep Impact experiment on Periodic Comet 9P/Tempel 1 was revealed to be about 4, which exceeds the value of 0.86 obtained in comet 78P/Gehrels 2 we presented last year. This is the largest value for short period comets so far, and comparable with those of Oort comets. We have two possible explanation of such large CAR value. One is related to the origin of short period comets. They comes from not only the Edgeworyh-kuiper Belt, but also the scattered objects originally formed in the region of the giant planets. Because the CAR is expected to be higher with inner part of the proto-planetary disk, the comets formed in such region should have high CAR value than those in the Edgeworth-Kuiper Belt. Another is the surface alternation of the solar heating. The surface of the short period comets tends to be changed by the solar radiation during the orbital motion. The dust grains may be altered, and be crystallized by some mechanism. In this presentation, we focus on these possibilities in order to explain the observed high CAR, together with the future prospects of observations.