**SPITZER SPECTROSCOPY OF COMET 73P/SCHWASSMANN-WACHMANN 3.** M. L. Sitko[1], E. F. Polomski[2], C. M. Lisse[3], D. E. Harker[4], D.K. Lynch[5], R. W. Russell[5], M. S. Kelley[6], B. A. Whitney[1], and M. J. Wolff [1], [1]Space Science Institute, sitko@spacescience.org, [2]U. Wisconsin at Stevens Point, [3]Johns Hopkins University, [4]U. California at San Diego, [5]The Aerospace Corporation, [6]University of Central Florida.

**Introduction:** The 2006 return of the fragmented comet 73P/Schawassman-Wachmann 3 provided an unprecedented opportunity to sample cometary material that had, until recently, been buried deep below its surface. We observed the two brightest components, [B] and [C], using the Infrared Spectrograph (IRS) of the *Spitzer Space Telescope*. The observations consisted of imaging at 22 µm and low resolution (with R~60-120) spectra from 5-35 µm, obtained pre-perihelion. [Spectral mapping, high spectral resolution (R~600) spectra were obtained pre-perihelion, and low-resolution spectra and images were obtained post-perihelion, but will not be discussed here.]

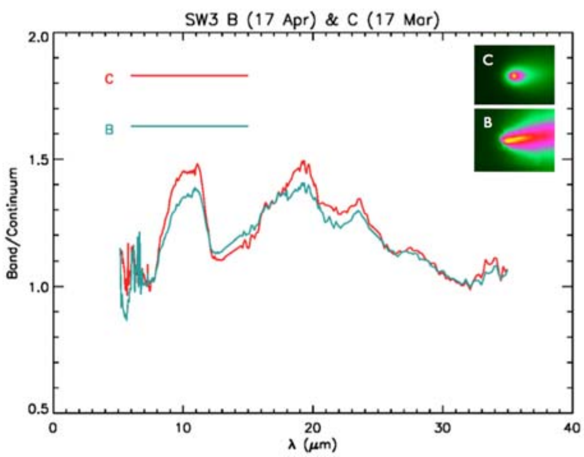


**Figure 1** – Emissivity of the dust, normalized to a blackbody continuum at 8 and 32 µm. Also shown are the Spitzer images of components B and C at 22µm.

**SW3-[C]:** Observations were obtained on 17 March UT, when the comet was at a heliocentric distance of 1.46 AU, and was 0.78 AU from *Spitzer*. Emission bands due to a mixture of amorphous and crystalline silicates were present. A spectral model of the emission indicates that roughly 1/3 of the dust mass was in the form of amorphous silicates, divided about evenly between materials with olivine and pyroxene composition; the crystal/amorph ratio of ~30% is low compared to the ratios found for comets Hale-Bopp and Tempel 1 [1,2]. Possibly 1/3 or more was amorphous carbon, but its abundance depends sensitively on the details of the extraction, calibration, and normalization procedures used for the data. The rest of the material observed was made up of water ice and gas, ferromagnesian carbonates, and metal sulfides. The strength of the 10 µm silicate band above the surrounding continuum, ~50% was about a factor of 2 greater than the mean value seen on other ecliptic comets.

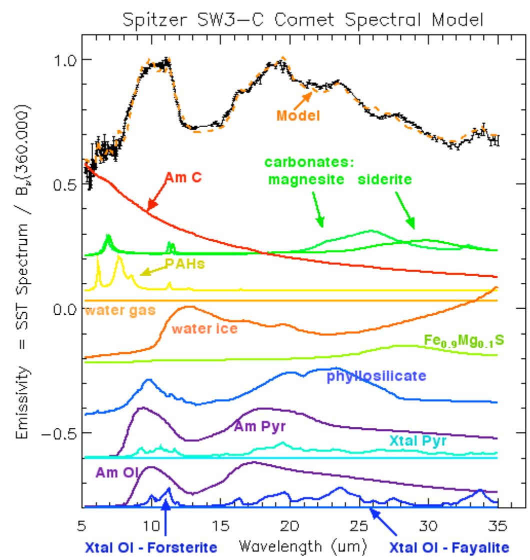


**Figure 2** – Emissivity spectrum for [C], and best-fit model showing the individual components that create the observed emission. Error bars are ±2σ.

**SW3-[B]:** Observations were obtained on 17 April UT, when the comet was at a heliocentric distance of 1.19 AU, and 0.45 AU from *Spitzer*, about 15 days after major nucleus fragmentation event. Compared to [C], the morphology at 22 µm was considerably extended, consistent with results *Hubble* obtained withn 30 hours of the *Spitzer* images. The silicate band strengths in [B] were smaller than in [C], consistent with ground-based spectra [3,4], and suggested larger particles than [C], despite the fact that [B] was fragmenting.

**References:** [1] Wooden, D.H. *et al.* 2000. *Icarus* **143**, 126. [2] Lisse, C.M. *et al.* 2006. *Science* **313**, 635 [3] Russell, R.W., *et al.* 2006. *DPS 38*, Abstract #1209. [4] Harker, D.E. *et al.* 2006. *DPS 38*, Asbtract #1204.

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