Estimated Mid-Infrared (200-2000 cm^{-1}) Optical Constants of Some Silica Polymorphs

Presentation Time: Thursday, 3:30 p.m. - 6:00 p.m.

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We use Lorentz-Lorenz dispersion analysis to model the mid-infrared (200-2000 cm^{-1}) optical constants, of opal-A, opal-CT, and tridymite. These minerals, which are all polymorphs of silica (SiO_2), are potentially important in the analysis of thermal emission spectra acquired by the Mars Global Surveyor Thermal Emission Spectrometer (MGS-TES) and Mars Exploration Rover Mini-TES instruments in orbit and on the surface of Mars as well as emission spectra acquired by telescopes of planetary disks and dust and debris clouds in young solar systems. Mineral samples were crushed, washed, and sieved and emissivity spectra of the >100 •m size fraction were acquired at Arizona State University's emissivity spectroscopy laboratory. Therefore, the spectra and optical constants are representative of all crystal orientations. Ideally, emissivity or reflectance measurements of single polished crystals or fine powders pressed to compact disks are used for the determination of mid-infrared optical constants. Measurements of these types of surfaces eliminate or minimize multiple reflections, providing a specular surface. Our measurements, however, likely produce a reasonable approximation of specular emissivity or reflectance, as the minimum particle size is greater than the maximum wavelength of light measured. Future work will include measurement of pressed disks of powdered samples in emission and reflection, and when possible, small single crystals under an IR reflectance microscope, which will allow us to assess the variability of spectra and optical constants under different sample preparation and measurement conditions.