FROM STARDUST TO PLANETS: FT-IR SPECTROSCOPY OF FINE-GRAINED PLANETARY MATERIALS. A. Morlok, G. C. Jones, M. M. Grady, Department of Mineralogy, The Natural History Museum, Cromwell Road, London SW7 5BD, e-mail A.Morlok@nhm.ac.uk

Introduction: Dust occurs in many astrophysical environments – around stars, ejecta from supernovae, in the interstellar medium, in dust clouds, and in our solar system as interplanetary dust particles (IDPs) or GEMS (glass with embedded metal and sulfides).

Dust is the basic building block of all larger bodies formed in the solar system: Planets, comets and asteroids. Some of these dust grains actually have survived until today (as IDPs or presolar grains), and are analyzed in laboratories by planetary scientists. Most of the presolar grains analyzed are carbonaceous (SiC, graphite, diamond), only few interstellar silicates have been measured [1].

Another source of data about dust comes from a different scientific community, information about the composition of dust particles is available from astronomical observations, e.g. the ISO satellite. Here, IR spectra provide information about mineral composition, structure and size of these particles. Crystalline silicates have been identified in IR spectra of cometary dust [2, 3], around protostars [4], protoplanetary nebulae [5] and circumstellar discs [6-9].

For comparison, IR spectra obtained in laboratories of 'pure' minerals are needed. So far mainly amorphous glasses [e.g. 10] or fine grained smokes [11] have been used as standard materials, rather than natural minerals. These studies also mostly concentrated on pure end members, which are rare in nature.

Minerals from meteorites are probably a better fit for the astronomical analyses, since they formed in a similar environment to the dust grains. So the aim of this project is to provide a database of infrared and optical spectra of well characterized minerals from representative meteorites.

Techniques: Mineral grains in size fractions <250 µm will be first characterized with electron beam methods and XRD. IR spectra will be obtained with a Perkin Elmer Spectrum One FT-IR microscope over a wavelength range of ~ 2.5 to 25 µm. If possible, oriented grains in their original morphology will be used, to get spectra similar to those from unprepared grains in space. For IR spectra in the best quality, these grains will be also analyzed after polishing. Spectra of randomly oriented grains (diffuse reflectance) will be also produced. To simulate the effects of changing environment on the spectra, measurement will be conducted at a range of temperatures with a heating/cooling stage. Also effects of irridation, size, morphology and coating with organic material will be investigated.

The data presented will be from mineral separates from type 3 ordinary chondrites: Parnallee (LL 3.6), Khohar (L 3.6) and Brownfield (H 3.7).

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