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Laboratory investigations aimed to study the chemical and physical properties of protoplanetary disk dust

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Infrared observations of edge-on protoplanetary disks clearly show the presence of absorption features assigned to refractory dust grains and to solid phase molecules which form the so called icy grain mantles. It is generally accepted that in protoplanetary disks dust grains suffer from thermal and energetic processing (i.e. UV and ion irradiation) caused by the central protostar.

The chemical and physical properties of disk dust can be obtained by the comparison between observations and laboratory spectra of dust grain analogs.

In laboratory investigations gas phase species are accreted on a cold substrate (10-20 K) under vacuum. Both inert materials and dust grain analogs can be used as substrate. Transmittance infrared spectra of the samples are taken at low temperature and after energetic processing and during warm up. Laboratory studies have shown that the chemical composition and the physical structure of the sample can be modified by energetic and thermal processing. Furthermore the profile (shape, width and peak position) of IR bands is a tracer of both the chemical and physical properties of the sample.

Here we will present some recent experimental results obtained in the Laboratorio di Astrofisica Sperimentale at INAF - Osservatorio Astrofisico di Catania and will discuss their relevance for the interpretation of the spectra that will be collected by the James Webb Space Telescope.

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