SEARCH FOR LABORATORY ANALOGUES OF INTERSTELLAR CARBONACEOUS NANOPARTICLES

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The mid-infrared emission bands ubiquitously observed in interstellar space have since long been recognized to involve hydrocarbonated aromatic material. A considerable progress in the understanding of these infrared features has been achieved during the last twenty years, thanks to many experimental and theoretical efforts, in which the Polycyclic Aromatic Hydrocarbons (PAHs) have focussed much of the attention. However, none of the attempts to match the interstellar spectra from laboratory data on PAH properties has yet been able to provide a fully satisfactory agreement. Then it is quite widely accepted nowadays that some kind of hydrocarbonated "nanograins" should exist, with sizes intermediate between the PAHs which are easily accessible to laboratory studies and the "standard" interstellar grains (ca 50 nm).

We will describe the preliminary results obtained with a new experimental set-up under development, aimed at the formation of carbonaceous nanoparticles and the characterization of their spectral properties. The strategy consists to use reactive media to prepare a whole family of chemically related compounds and to control their chemical composition and the growth of the particles. We have used in particular a hydrocarbon-riched premixed flat flame as a reactor. When operated under low-pressure conditions, the spatial development of the flame allows us to sample its content at various stages of the particles growth. The analysis can be made by transmission spectroscopy of thin film deposits under infrared microscope, and by Time-Of-Flight mass spectrometry.

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