N91-14990

# VUV-VISIBLE MEASUREMENTS ON DIFFERENT SAMPLES OF AMORPHOUS CARBON

A. Blanco*, A. Borghesi*, E. Bussoletti**, L. Colangeli***, S. Fonti*, H.E. Gumlich****, Ch. Jung****, V. Orofino*, G. Schwehm***
* Physics Department, University of Lecce, Lecce, Italy
** Istituto Universitario Navale and Osservatorio Astronomico di Capodimonte, Napoli, Italy
*** Space Science Department of ESA/ESTEC, Noordwijk, The Netherlands
**** Technische Universitat Berlin, West Germany

## 1. INTRODUCTION

Among various candidate materials for interstellar dust, amorphous carbon (AC) is playing an increasingly important role (Greenstein, 1981; Hecht et al., 1984; Jura, 1983, 1986). Furthermore, recent "in situ" measurements have clearly shown the presence of carbonaceous grains in the coma of comet Halley (Kissel et al., 1986). Laboratory investigations on AC grains may be very useful to better interpret observations and to support theoretical elaborations.

Previous extinction measurements on AC grains (Borghesi et al., 1985; Colangeli et al., 1986; Bussoletti et al., 1987) have evidenced an UV hump, quite similar to the 220 nm "interstellar extinction bump". In addition, the near IR absorption spectrum of AC particles shows bands which match some of the so-called interstellar "unidentified infrared bands", detected in many celestial sources (Borghesi et al., 1987; Blanco et al., 1988), and the 3.4 $\mu m$ emission band observed in Halley's spectrum (Colangeli et al., 1988).

Recently, we have started an international research program which also includes UV extinction analyses on AC samples, by using synchrotron light. We present here preliminary results obtained in a first shift of measurements, last june.

## 2. EXPERIMENTAL

The AC dust particles have been produced by arc discharge between two amorphous carbon electrodes, in a controlled Ar atmosphere (p = 1 Torr) and collected on Litium Fluoride (LiF) windows (cutoff = 105 nm). The UV extinction measurements have been performed using the BESSY-synchrotron light facility in West Berlin. Two sets of samples have been analyzed, so far, allowing also for low temperature tests:

| Set | Samples | d (cm) |
|---|---|---|
| I | 1,2,3,4 | 3,5,7,10 |
| II | 5,6 | 5, 10 |

where "d" is the collecting distance of the samples from the arc discharge. The LiF windows used in the two series of measurements show slightly different transmission properties (Figure 1). Furthermore, the samples of each set are characterized by almost the same surface density of dust, $\sigma$, but samples of set II have $\sigma$ values higher than those of set I.

## 3. RESULTS

Some examples of the obtained spectra are summarized in Figures 2-4. At the present stage of the data analysis we can only draw some preliminary considerations:

a) a wide band falling at around 240 nm is detected in all the analyzed samples. Its intensity seems to decrease with increasing the dust collecting distance (Figure 2).
b) a peak at 150 nm decreases in intensity with increasing the collecting distance. The band seems absent in the samples characterized by a larger amount of dust (Figure 3).
c) a feature at about 200 nm is detected in some samples. At the moment we tend to attribute it to the transmission properties of the LiF substrates at that wavelength (Figure 1) and/or to some problems in the experimental setup.
d) it is unclear if a hump at 120 nm is real or due to instrumental effects.
e) the profile of the spectra does not show substantial changes when the samples are cooled down to about 100 K (Figure 4).

The present results appear to be in general agreement with previous findings, but their analysis is in progress and the interpretation is still on the way.


Blanco, A., Bussoletti, E. and Colangeli, L.: 1988, Astrophys. J., in press.

Borghesi, A., Bussoletti, E. and Colangeli, L.: 1985, Astron. Astrophys. 142, 225.

Borghesi, A., Bussoletti, E. and Colangeli, L.: 1987, Astrophys. J. 314, 422.

Bussoletti, E., Colangeli, L., Borghesi, A., Orofino, V.: 1987, Astron. Astrophys. Suppl. Ser. 70, 257.

Colangeli, L., Capozzi, V., Bussoletti, E. and Minafra, A.: 1986, Astron. Astrophys. 168, 349.

Colangeli, L., Schwehm, G., Bussoletti, E., Blanco, A., Fonti, S., Orofino, V.: 1988, Astrophys. J., submitted

Greenstein, J. L.: 1981, Astrophys. J. 245, 124.

Hecht, J. H., Holm, A. V., Donn, B. and Wu, C. C.: 1984, Astrophys. J. 280, 228.

Jura, M.: 1983, Astrophys. J. 267, 647.

Jura, M.: 1986, Astrophys. J. 303, 327.

Kissel, J., et al.: 1986, Nature 321, 280.

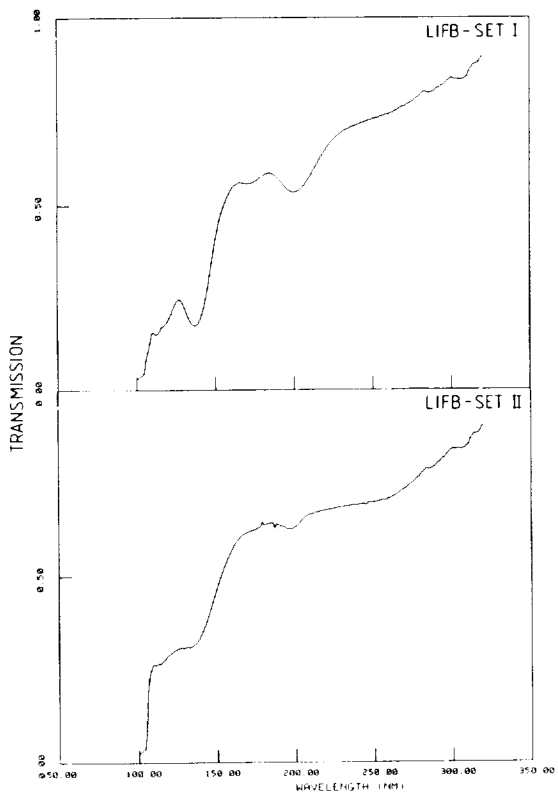


Figure 1. Transmission spectra of Litium Fluoride windows (LiFB) used in the two sets of measurements.

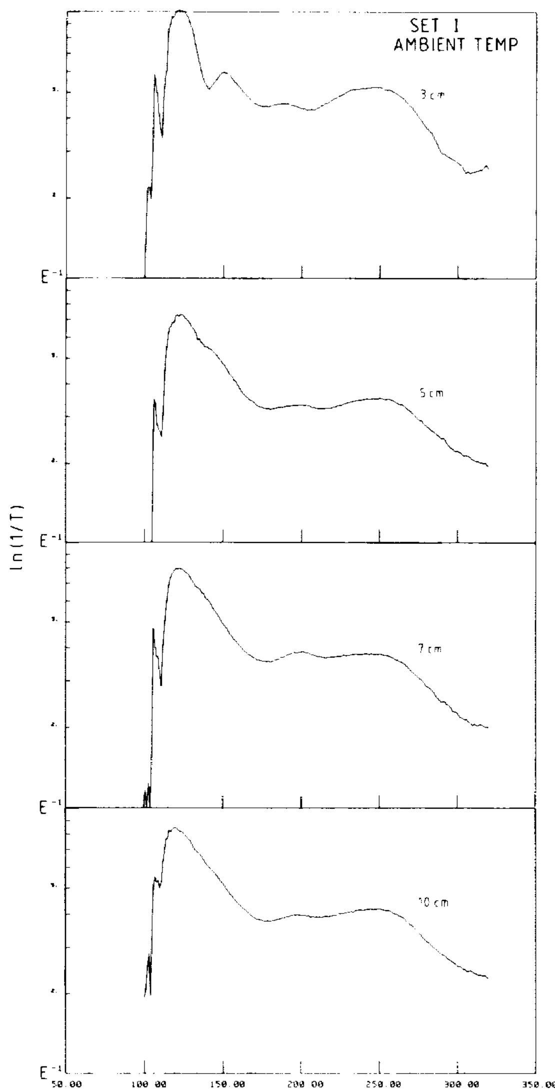


Figure 2. Normalized extinction coefficient at ambient temperature for AC samples of set I.

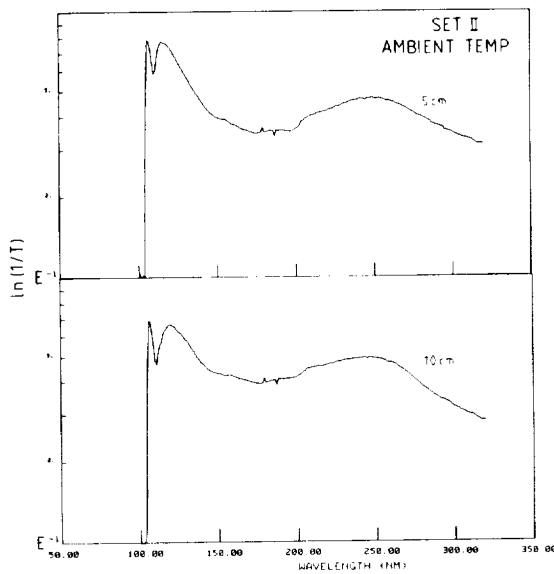


Figure 3. Normalized extinction coefficient at ambient temperature for AC samples of set II.

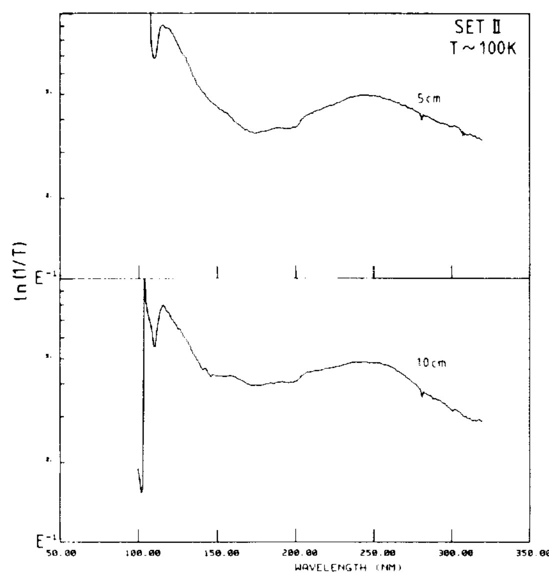


Figure 4. Normalized extinction coefficient at 100 K for AC samples of set II.