NEW CLUES ON COMPOSITION AND STRUCTURE OF CARBONACEOUS MATTER IN ANTARCTIC MICRO-METEORITES. E. Dobrică[1], C. Engrand[1], E. Quirico[2], G. Montagnac[3] and J. Duprat[1]. [1]CSNSM CNRS-Univ. Paris Sud, 91405 Orsay Campus, France (Elena.Dobrica@csnsm.in2p3.fr), [2]LPG Univ. J. Fourier CNRS-INSU 38041 Grenoble Cedex 09, France. [3]LST-Lyon CNRS, 69364 Lyon Cedex 07, France.

Introduction: The carbonaceous matter of 19 Antarctic micrometeorites (AMMs) was characterized by Raman and infrared (IR) micro-spectroscopy. The AMMs were collected at Dome C [1] and include 6 fine-grained–Fg (among them 3 ultracarbonaceous–UCAMMs [2]), 8 intermediate–Sc/Fg and 5 scoriaceous particles–Sc [3]. Two cosmic spherules (CS) were also analyzed. Raman measurements were performed with 2 Labram micro-spectrometers (514 nm and 244 nm excitation) [4-5]. Micro-IR spectra were taken with a Hyperion 3000 micro-imaging system from 4000 to 950 cm^{-1}. Whole rock (WR) ordinary chondrites, and WR carbonaceous chondrites (CCs) and their extracted insoluble organic matter (IOM) were used as standards.

Results and discussion: Sixteen out of 19 AMMs present the first-order carbon bands (G and D) in the 514 nm Raman spectrum, showing a polyaromatic structure of their carbonaceous matter. Band fitting and Principal Component Analysis of their spectra reveal no significant degree of structural order among all textural types (i.e. from Fg, UCAMMs to Sc AMMs). The 3 remaining AMMs (including one UCAMM) show odd 514 nm Raman spectra with unidentified bands. No carbon was detected in the two CSs. Thus, atmospheric entry heating has no effect on the maturation of carbonaceous matter in AMMs, even in partially melted scoriaceous AMMs. Accordingly, laboratory experiments on carbonaceous matter require long durations (> several minutes) to significantly graphitize any carbonaceous compounds [e.g. 6]. This strongly strengthen the hypothesis of very short durations ($5s < t < 120s$; [7]) of AMM pulse heating during atmospheric entry. It is however not yet possible to exclude some chemical modifications of this carbonaceous matter. While the 514 nm Raman analysis did not reveal significant differences among all types of AMMs and CC IOMs, 244 nm Raman spectra on 2 UCAMMs unambiguously show differences in their polyaromatic structures. These differences might be controlled by chemical composition variations and/or structural modifications induced by alteration processes, either in solar cavity or in the parent body. The 244 nm Raman spectra also show for the first time the presence of the nitrile (–CN) functional group in UCAMMs. Micro-IR spectra reveal the presence of aliphatic functions (e.g. $–CH_3$), and other functional groups typical of kerogen-like materials. A systematic survey on AMMs by micro-IR imaging reveals that all AMM but one (scoriaceous) AMMs are anhydrous. As UCAMMs-like grains are unknown in meteorites, they could constitute a family of cometary grains. The characterization of their carbonaceous matter is thus important and should be compared with Stardust samples.

References: [1] Duprat J., *et al.* (2007) *Adv. Space Res.* 39, 605-611. [2] Dobrica E., *et al.* (2008) LPSC XXXIX, #1672. [3] Genge M.J., *et al.* (2008) *MAPS*, in press. [4] Quirico E., *et al.* (2005) *Spectr. Acta* Part A 61, 2368-2377. [5] Quirico E., *et al.* (2008) this conference. [6] Bény-bassez C. and Rouzaud J.-N. (1985) *Scan. Elec. Microscopy*, 119-132. [7] Toppani A. *et al.* (2001) *Meteoritics Planet. Science* 36, 1377-1396.