COMBINED MICRORAMAN AND C- N- ISOTOPIC STUDY OF DISORDERED CARBONS IN ACAPULCOITES - LODRANITES. E. Charon[1,2], J. Aléon[2] and J.N. Rouzaud[1]. [1]Laboratoire de Géologie de l'Ecole Normale Supérieure, UMR CNRS 8538, 24 rue Lhomond 75231 Paris Cédex5. [2]Centre de Spectrométrie Nucléaire et de Spectrométrie de Masse, UMR 8609, Université Paris Sud XI 91405 Orsay Campus. charon@geologie.ens.fr.

Introduction: Primitive achondrites have textures and mineralogy indicative of partial melting but preserve numerous primitive geochemical characteristics (e.g. ~chondritic bulk chemical composition or chondritic abundances of volatile elements). Notably “graphitic” carbons have been described in acapulcoites and lodranites [1-3], with highly diverse carbon and nitrogen isotopic compositions attributed to the preservation of pre-accretionary signatures. In order to establish a link between these more or less evolved (graphitized) carbons with the organic matter (very disordered), synthesized in the protosolar nebula and preserved in carbonaceous chondrites, and to determine the degree of the reorganization of the carbonaceous material (graphitization) during the differentiation, we initiated a systematic µRaman-SIMS-TEM study of carbons in a suite of 5 acapulcoites and 1 lodranite showing variable degrees of recrystallization (NWA 725, Dhofar 1222, Dhofar 125, Monument Draw, Acapulco and Lodran). Here we report preliminary Raman microspectrometry results obtained on all meteorites at the Ecole Normale Supérieure and C and N isotopes measured with the IMS 4F at the Montpellier University facility in carbons from Acapulco.

Results: Acapulco exhibits the largest diversity of carbons with eight different morphological types [2]. No carbon grains were found embedded in the metal of the least metamorphosed acapulcoites, whereas Lodran present several types of carbon similar to those in Acapulco. The first Raman characterizations indicate that none of the Acapulco carbon types can be ascribed to pure graphite (always a detectable D band). They show variable degrees of order similar to those commonly observed in carbons formed by catalytic exsolution from Fe metal. Preliminary C and N isotopic results indicate that the C coating can contribute up to 10‰ on the $\delta^{13}C$ depending on the porosity of the sample. With the assumption (which remains to be verified) that this effect is negligible for Acapulco carbons our measurements agree with previous results [3]: $\delta^{13}C$ extend from -38‰ to +38‰ with a significant peak around the $\delta^{13}C$ of insoluble organic matter from carbonaceous chondrites (-10‰ to -20‰) and $\delta^{15}N$ range from -162‰, the composition of Acapulco metal to ~0‰, the composition of Acapulco silicates [4]. No systematic correlation with the Raman spectra has been observed but similar morphologies of carbons seem to exhibit similar isotope systematic, which suggests that parent-body effects may be significant.

Perspectives: In order to understand to which extent these isotopic variations can be ascribed to preserved precursors but also to carbons newly formed, possibly by catalytic exsolution from metal during high temperature events, it is now planned to study the carbons nanostructures using HRTEM on FIB sections of the carbons previously characterized by SIMS.

References: [1] El Goresy A. et al. 1995. *Nature* 373. pp. 496-499. [2] El Goresy A. et al. 2005. *Geochimica et Cosmochimica Acta* Vol.69. No18. pp. 4535-4556. [3] McCoy T.J. et al. 2006. *Geochimica et Cosmochimica Acta* Vol.70. pp. 516-531. [4] Marti, K. et al. 2002 *Geochimica et Cosmochimica Acta* Vol.66. pp. A487-A487.