THERMAL HISTORY OF TYPE 3 CHONDRITES OF THE NASA ANTARCTIC COLLECTION: A PRELIMINARY REPORT. L. Bonal[1*], E. Quirico[1], and J-L Hazemann[2]. 1. Institut de Planétologie et d'Astrophysique de Grenoble (IPAG), UJF-Grenoble 1/CNRS-INSU, France. 2. Institut Louis Neel CNRS/UJF-Grenoble 1, France. (*email: lydie.bonal@obs.ujf-grenoble.fr)

Chondrites are the most primitive meteorites. However, they were all modified in some way by asteroidal geological processes operating over 4.5 Gyr. Hence, to decipher the formation and origins of their components, we must first understand how chondritic materials were modified in their asteroidal parent bodies. The modifications induced by secondary processes should not be underestimated and have to be precisely estimated before any interpretation of chondrite properties in terms of cosmochemistry.

Raman spectroscopy enables the determination of the degree of structural order of the polyaromatic organic matter present in the matrix of chondrites. This structural order directly reflects the thermal history of the host meteorites in their parent bodies. Raman spectroscopy is particularly sensitive to the lowest petrologic types (3.0-3.2). The transformation of aromatic carbonaceous matter towards graphite is irreversible, and independent of the mineralogy and degree of aqueous alteration: it is mainly controlled by the peak metamorphic temperature. Moreover, under the assumption of fairly similar organic precursors, the degree of organization of polyaromatic organic matter allows for a direct comparison of the metamorphic grade of objects from different chondritic groups. It is then possible to evaluate the metamorphic grade of the objects and to assign a petrologic type along a unique petrologic scale [1-4]. This technique has been successfully applied to type 3 Unequilibrated Ordinary Chondrites [1], carbonaceous CV [2] and CO [3] chondrites. Both falls and finds, from Antarctica [4] and elsewhere, have been analyzed.

The present NASA collection of Antarctic meteorites represents an incredible source of precious samples for our community. The objective of the present work is to finely characterize the thermal history of most of the type 3 chondrites from that collection. *(i)* Reliable petrologic types will be assessed; *(ii)* the most primitive type 3 chondrites (petrologic type $\leq$ 3.1) will be identified; and *(iii)* potential samples having experienced a slightly different thermal history will be pointed out.

The Meteorite Working Group of the Johnson Space Center is generously currently allocating us with more than 150 chondrites (Unequilibrated Ordinary Chondrites, carbonaceous CV and CO chondrites). Out of 60 chondrites received so far, the thermal histories of 40 samples have already been characterized. Real discrepancies with the preliminary JSC petrologic type attribution were already found.

Characterization of the thermal history of type 3 chondrites based on the structural order of the polyaromatic carbonaceous material is a reliable, non-destructive, and relatively-easy-to-apply method. We encourage museums to routinely use it before the samples being accessible to the community.

References: [1] Quirico et al. (2003) *MAPS* 38, 795. [2] Bonal (2006) PhD dissertation. University Joseph Fourier – Grenoble I. [3] Bonal et al. (2006) *GCA* 70, 1849. [4] Bonal et al. (2007) *GCA* 71, 1605.