RAMAN SPECTROSCOPIC STUDY OF ALLENDE (CV3) AND SARATOV (L4) ORIGINAL RESIDUES AND THEIR ETCHED RESIDUES.

J. Matsuda[1], K. Morishita[1], M. Nara[2] and S. Amari[3]. [1] Department of Earth and Planetary Science, Graduate School of Science, Osaka University, Toyonaka 1-1, Osaka 560-0043, Japan (e-mail: matsuda@ess.sci.osaka-u.ac.jp), [2]Laboratory of Chemistry, College of Liberal Arts and Science, Tokyo Medical and Dental University, Chiba 272-0827, Japan. [3]Laboratory for Space Sciences and the Physics Department, Washington University, St. Louis, MO 63130-4899, USA.

Introduction: The planetary noble gases that are highly enriched in heavy noble gases in meteorites are carried by so-called "phase Q". Phase Q is a very small portion of meteorites and is not dissolved by HF/HCl, but is destroyed by oxidants such as HNO_3, $Na_2Cr_2O_7$ etc. Phase Q is supposed to be carbonaceous material [1], but its precise chemical state is not well known. In this study, we examined the original HF/HCl residues (Q-rich) and their etched residues (Q-poor) for Allende (CV3) and Saratov (L4) using Raman spectroscopy that is very useful to investigate the carbon structure.

Sample and Experimental: We prepared the original HF-HCl residues using a chemical procedure commonly used to concentrate Q. The original residues were further treated with oxidant and we got the etched residues. The noble gas measurements were carried out using the VG5400 noble gas mass spectrometer in Osaka University. We confirmed that the heavy noble gases were surely enriched in the original residues (Q-rich) but depleted in the etched residue (Q-poor). We also prepared a colloidal fraction for the Allende original residue. The Raman spectroscopy was carried out using a Raman microscope (Kaiser Hololab 5000, Kaiser Optical Systems, Inc.) with a 532nm YAG laser.

Results and Discussion: Noble gas concentrations in the colloidal fraction are a factor of 2-4 higher than those in the non-colloidal fraction. The Raman spectroscopic parameters show the typical features that the colloidal fraction of the original residue is more amorphous compared to the non -colloidal fraction. As the ion irradiation evolves the carbon into more amorphous [2], we conclude that the "plasma model" [3] is plausible as the origin of phase Q.

Meanwhile, the Raman spectroscopic parameters of the original residues have changed discretely after the oxidation in both meteorites. This suggests that the oxidization not only dissolve out the oxidizable carbon but also change the whole carbon structure. Our Raman spectroscopic results indicate that the oxidation changes the carbon structure to more amorphous (disordered) state in both meteorites. It indicates that release of Q-gases is not accompanied with a mass loss and it is simply due to the disordered rearrangement of carbon structure by oxidation [1, 4], although there still is a possibility that phase Q consists of very fine grains of a discrete phase and it is always covered by the major disordered carbon during the Raman spectroscopic observation.

References: [1] Ott U. et al. 1981. *Geochim. Cosmochim. Acta* 45:1751-1788. [2] Brunetto et al. 2009. *Icarus* 200:323-337. [3] Matsuda J. and Yoshida T. 2001. *Meteoritics & Planetary Science* 36:A127. [4] Ott U. 2002. *Reviews in Mineralogy and Geochemistry* 47:71-100.