TOF-SIMS ANALYSIS OF ISOTOPICALLY ANOMALOUS PHASES IN RENAZZO MATRIX. J. Leitner[1], T. Stephan[1], C. Floss[2], F. J. Stadermann[2], [1]Institut für Planetologie/ICEM, Universität Münster, Wilhelm-Klemm-Str. 10, 48149 Münster, Germany (leitner@uni-muenster.de), [2]Laboratory for Space Sciences, Washington University, St. Louis MO 63130, USA.

Introduction: Deuterium and ^{15}N enrichments are often observed in primitive solar system material like carbonaceous chondrites and IDPs [1]. However, the actual carrier phases of these anomalies are unknown. The purpose of the present study is to identify these carriers in matrix material of the CR chondrite Renazzo by using time-of-flight secondary ion mass spectrometry (TOF-SIMS).

Samples and Analytical Techniques: Samples of Renazzo matrix material were heated for two hours at temperatures between 200 and 1000 °C in steps of 100 °C in two series, under vacuum and in air, respectively [2]. These samples, as well as an unheated sample for comparison, were pressed in Au and analyzed in a previous study, which showed the loss of D and ^{15}N anomalies with increasing temperature [2,3]. Samples heated at 1000 °C in air and unheated material were selected for our first TOF-SIMS analyses.

Three different regions (150x150 µm^2 – 200x200 µm^2) of heated and unheated samples containing several grains each, were sputter-cleaned with a 3 keV Ar^+ ion beam prior to the TOF-SIMS investigation to remove surface contamination from previous sample handling. TOF-SIMS analyses [4] were performed at high lateral resolution (~0.3 µm) and high mass resolution ($m/\Delta m$ up to 10000 at FWHM). Positive as well as negative secondary ions were analyzed in sequential measurements.

Results and Discussion: Comparing the two Renazzo samples, we note a loss of H, C, S, Pb, and the halogens during heating. Other elements, such as Li, Sc, V, Cr, and Cu, show higher ion signals relative to Si in the heated samples. In particular, we note an increase in the major element Mg. The ion signals correspond to Mg contents of ~3 wt% for the unheated and ~8 wt% for the heated samples. The latter value comes close to the average value for Renazzo matrix of 9.67 wt% reported in the literature [5] whereas the former value seems to be too low. This behavior may be explained by a loss of hydrocarbons in the immediate neighborhood of a Mg-rich phase during heating [6].

Intensities of low-mass hydrocarbons relative to Si decrease during heating but to various degrees. For example, CN^- decreases by a factor of ~2.2 whereas C^-, CH^-, CH_2^-, C_2^-, and C_2H^- decrease by factors of 2.5–4. For some N-bearing secondary ions like N^+, NH^-, NH_2^+, NH_3^+, NH_4^+, and NO^+ we observe almost identical abundances for heated and unheated samples or even a slight increase after heating. Polycyclic aromatic hydrocarbons (PAHs) also show higher intensities in the heated samples.

These results suggest that at least two different N-containing phases are present, a ^{15}N-enriched low-temperature organic phase that accounts for ~50 % of the CN^- signal and that is associated with Mg-rich material, and an isotopically normal high-temperature phase. Further analyses of the lateral distributions of isotopic anomalies, elements, and molecules will be performed in the future.

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