NO MEANINGFUL CORRELATION BETWEEN MINERALOGY AND NOBLE GAS COMPOSITIONS OF CARBONACEOUS MATERIALS IN SHİŞİR 007 UREILITE.

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Shişır 007 is an olivine-pigeonite type monomict ureilite and experienced moderate S3 shock responsible for irregular and sub-parallel fractures in olivine [1, 2]. Diamond, compressed graphite, and normal graphite occur in a large blade-like shape carbonaceous material (BCM; 1000×1500μm in size) [2]. In this study, mineralogy and noble gas compositions of the BCM are compared to those of other, more common amoeboid-shape carbonaceous material (ACM; typically 100-300μm in size) to clue formation process of enigmatic carbon phases in ureilites.

Half the BCM was cut into small pieces typically 200-300μm in diameter, and they were analyzed by synchrotron X-ray diffraction (XRD) and subsequently by noble gas mass spectroscopy [2]. A specimen prepared from the rest of BCM using a FIB technique was investigated by a high resolution TEM (HRTEM). ACM samples were separated from the polished section with HF/HCl, and were measured by XRD and noble gas analyses. Noble gas analyses of 9 separated BCMs and 7 ACMs were performed by the stepwise pyrolysis (600, 1300, 1900, and 2100°C).

Like BCM, ACMs occur at silicate-silicate grain boundary and are composed of fine-grained diamond and compressed and normal graphites. Separated ACMs and BCMs have variable diamond/graphite ratios with a similar range and release a greater part (80–95%) of primordial ^36^Ar, ^84^Kr, and ^132^Xe at 1300-2100°C. The separated ACMs have variable ^36^Ar contents (30-200×10^-6 ccSTP/g) and ^36^Ar/^132^Xe elemental ratios (150-200), while separated BCMs show a wider range of ^36^Ar contents (3-400×10^-6 ccSTP/g) and a higher ^36^Ar/^132^Xe ratios (200-450).

The HRTEM observation of the BCM specimen reveals that it consists of diamond, graphite, and amorphous carbon. High-temperature release of primordial noble gases suggests that diamond and amorphous carbon are main gas carriers [3,4]. However, simple mixing of these two components cannot explain the wide variations in gas contents and elemental ratios in individual separated BCMs and ACMs. Rather, both diamond and/or amorphous carbon would have variable noble gas concentrations and elemental ratios. The heterogeneous noble gas compositions of the BCMs and ACMs imply that they have formed from multiple stages of thermal and shock metamorphism [5].