NOBLE GASES IN THE LIGHT AND DARK PHASE OF A METEORITE FOUND IN NOVATO, CALIFORNIA.

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Introduction: Most new meteorites are either *finds* from collections in hot and cold deserts or -much rarer- observed *falls*, occasionally breaking a lot of glass and then the news [1]. Falls are preferable for noble gas study as they are usually less weathered. Another pathway to relatively unweathered meteorites is to use dedicated camera networks or accidental video, photographic, and radar observations [2-4] and immediately search at the predicted impact sites. Such observations measure also the trajectory and orbit of the meteor, which can be used to investigate its origin. The dedicated CAMS video meteor network [5] observed a fireball on Oct. 17th, 2012, which led to the find of several meteorites near Novato, CA. The shocked L6 chondrites show light and dark morphologies [6]. Here, we present noble gas analyses on small chips of the first recovered meteorite to initially assess its trapped noble gases, its cosmic-ray exposure (CRE) and radiogenic ages and potential differences in the two morphologies.

Experimental: The noble gases in 2.3 and 2.5 mg of the dark and light phase (NO1-1) were extracted at ~1700 ºC and measured in Zurich. The small masses were chosen to prevent overload in case of present solar wind, and resulted in large blanks, up to 90 %. Larger fragments will be measured to more precisely determine trapped Kr-Xe, and small fragments (~2 mg each), currently being neutron-irradiated, will be used to closer examine Ar-Ar systematics, halogens, and, potentially, the I-Xe system.

Results and Discussion: Concentrations and isotope ratios in both samples are generally similar, and consistent with entirely cosmogenic and radiogenic He, Ne, ^{38,40}Ar and very small amounts of trapped ^{36}Ar, Kr and Xe. In spite of the blank corrections, most abundances and ratios for He-Ar are within 20% consistent with the larger samples discussed in [7]. The only exception is ^{40}Ar, which is ~3 times more abundant in the dark compared to the light phase and ~2 times more than detected in [7]. This abundance may still suggest ^{40}Ar loss after L chondrite formation ~4.5 Ga ago, if assuming a typical K concentration. The variations can be due to K heterogeneity or distinct ^{40}Ar retentivity, e.g. upon shock, and will be examined in more detail in the neutron-irradiated fragments. No fragment contains solar wind, which is often associated with dark lithologies in brecciated meteorites [8]. This lack is observed in most L6 chondrites. The CRE age of ~6 Ma has been observed for a number of L chondrites with "low" ^{40}Ar [9]. Trapped Kr and Xe are at the lower end of what is found in type 6 ordinary chondrites [10], possibly due to the reduced weathering. ^{84}Kr/^{132}Xe is ~2 and ^{129}Xe/^{132}Xe ~1.2 in both lithologies, which illustrates the presence of dominantly meteoritic over terrestrial noble gases.

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