Ca-K and Al-Mg Studies of CAIs from CH and CR chondrites. G. Srinivasan and A. Bischoff, 1Physical Research Laboratory, Ahmedabad 380 009, India (email: srini@prl.ernet.in). 2Institut für Planetologie, Wilhelm-Klemm-Str. 10, 48149 Münster, Germany (email: bischoa@nwz.uni-muenster.de).

Introduction: The CH carbonaceous chondrites are characterized by extremely refractory calcium aluminum-rich inclusions [1-3]. CAIs have abundant grossite, hibonite, and perovskite in addition to melilitite, spinel and pyroxene. Most of the CAIs from CH chondrites are characterized by lack of $^{26}$Al or $^{26}$Mg excess [4] but are characterized by pristine O-isotope composition [5], and nearly normal Ca and Ti composition [4]. The CR carbonaceous chondrites are characterized by abundant inclusions that are usually fine grained, irregularly shaped and smaller than 300 µm [6]. A few grossite containing inclusions from CR chondrite Acfer 059-El Djouf 001 show evidence for $^{26}$Al with canonical abundance [4].

A study of CH and CR chondrites for their Al-Mg, Ca-K and Be-B systematics to establish the presence of correlation or its absence between the short-lived radionuclides $^{26}$Al, $^{41}$Ca and $^{10}$Be. CH chondrites are ideally suited to answer the above question as they are some of the most primitive samples in the solar system. The CR chondrite CAIs have not been systematically studied for isotopic or trace element composition.

From the CH chondrite Acfer 182 [1] and the CR chondrite Acfer 90097, Acfer 90186 [2] the isotopic compositions of 5 Ca-Al-rich inclusions (CAIs) were studied. The inclusions from Acfer 182 were studied earlier for Al-Mg and trace element data. [1-4]

Mineralogy: The CAIs #022/1 and #022/2 are from the CH chondrite Acfer 182. CAI 022/1 shown in [1] is with 450 µm in apparent diameter the largest CAI found in Acfer 182 and consists of a hibonite core surrounded by abundant spinel and minor fassaite and melilitite. CAI 022/2 [1,3] is a grossite-rich inclusion rimmed by thin layers of spinel, mellilitite, and Ca pyroxene.

The following CAIs are from the Acfer/El Djouf CR chondrite: #398/C, #303/1, #303/8. Ca-Al-rich inclusion 398/C (shown in [5]) is a compact melilitite-rich inclusion containing hibonite, spinel, and perovskite. Inclusion 303/1 belongs to the forsterite-bearing objects (OAS [5]), whereas 303/8 is a spinel-pyroxene aggregate [5].

Ca-K data: The 022/1, which is the largest hibonite CAI from CH chondrite, was analyzed for Ca-K isotopic system. The hibonite from the core yields a $^{40}$Ca/$^{39}$K values of ~ 7x10^{5} and $^{41}$K excess of ~ 400 ± 300 % 2σm, suggesting an initial $^{41}$Ca/$^{40}$Ca of nearly 2x10^{8} similar to the values observed in Efremovka CAIs. However this CAI has no initial $^{26}$Al [4]. The grossite in CAI 022/2 has very low Ca/K ~ 2000 which makes it unsuitable to determine the presence of $^{41}$Ca at the time of its formation.

Al-Mg data: In the CR chondrites the CAIs 398/C, 303/1, 303/8 were analyzed. The melilitites ($^{27}$Al/$^{24}$Mg ~ 6 to 12) and hibonites ($^{27}$Al/$^{24}$Mg ~ 15 to 25) in the first two CAIs have suitably high Al/Mg values, and the initial $^{26}$Al values are close to the canonical value of ~ 5x10^{-5}. Further work to determine the initial $^{41}$Ca abundance in these CAIs is in progress.

The CAI 022/1 for the first time shows evidence for lack of correlation between the abundance of $^{26}$Al and $^{41}$Ca. A further rigorous analysis of this CAI is in progress to recheck for this lack of correlation. This lack of correlation suggests that the source for $^{26}$Al and $^{41}$Ca need not be the same as suggested earlier [7]. The CAIs from CR chondrites both with grossite [4] and those with melilitite and hibonite (this work) have uniform $^{26}$Al abundance suggesting that they formed within a narrow interval of time from the same reservoir.