REFRACTORY INCLUSIONS FROM THE CM2 CHONDRITE LEW85311. S. B. Simon[1], C. G. Keaton[2], and L. Grossman[1,3]. [1]Dept. Geophysical Sci., The University of Chicago, 5734 S. Ellis Ave., Chicago, IL 60637. E-mail: sbs8@midway.uchicago.edu [2]Illinois Math and Science Academy, Aurora, IL 60506. [3]The Enrico Fermi Inst., The Univ. of Chicago, Chicago, IL 60637.

Introduction: Freeze-thaw disaggregation, followed by density separation in heavy liquids and hand-picking under a binocular microscope, has proven to be an effective technique for recovery of refractory inclusions from CM chondrites [1]; yet, few meteorites have been studied this way. We applied this technique to Antarctic CM LEW85311 (LEW) to characterize its refractory inclusion population and to compare it to that of the well-studied Murchison. We selected this meteorite because, of the CMs large enough for this type of study, its bulk oxygen isotopic composition is the most ^{16}O-rich, suggesting it is the least hydrothermally altered [2].

Methods: Following 31 freeze-thaw cycles, particles that sank in a methylene iodide-acetone solution were examined under a binocular microscope. A suite of spherical and/or blue particles were mounted, polished, studied with a scanning electron microscope, and analyzed by electron probe.

Results: Of 42 particles examined thus far, 32 are chondrules, nine are hibonite-bearing inclusions and one is a hibonite crystal ~150 µm long. Eight are porous, spinel(sp)-hibonite(hib)-perovskite(pv)±melilite(mel) objects generally similar to many previously found in CMs. In contrast with disaggregated Murchison samples [1, 3], we have found no inclusions with phyllosilicate or Al-diopside rims, and none contain any Al-diopside, a phase common in Murchison and Mighei [1, 3, 4]. Three inclusions have additional unusual features. One is a sp-free, very compact, probably sintered aggregate of hibonite grains that are ~40 µm long. Some have serrated boundaries, interlocking with adjacent grains. Most pv is interstitial to hib. In sharp contrast is an oval (300 x 400 µm), hollow inclusion (#R10). It is basically a shell of material with typical spherule mineralogy: hibonite blades in spinel with relatively coarse (~15µm) mel and blebby pv. Inclusion R11 is large (~400 µm in diameter), very porous, and zoned, with a spinel-dominated mantle and a hib-dominated core. In both R10 and R11 mel occurs in contact with hib. In R10 the contacts are diffuse. In R11, they are sharp and, in many places, mel mantles hib. As in Murchison, spinel V_2O_3 contents are positively correlated with V_2O_3 contents of coexisting hib, but TiO_2 contents of coexisting hib and sp are not correlated. As in Murchison, mel is $Åk_{0-15}$.

Discussion: Refractory inclusions from LEW exhibit some similarities and some differences with inclusions from Murchison and Mighei, and the differences could be quite important. In spinel-rich Murchison inclusions, mel is very rarely in contact with hibonite, and even more rarely mantles it. The unusual textures of R10 and R11 probably reflect incipient conversion of hibonite to mel, predicted by thermodynamic models but rarely seen in samples. LEW may have sampled a higher proportion of inclusions in which the hibonite-to-mel reaction is recorded than Murchison. Such samples will help us understand the origin of mel-poor, hibonite-, spinel-rich inclusions.

References: [1] MacPherson G. J. et al. 1983. *Geochimica et Cosmochimica Acta 47*:823-839. [2] Clayton R. N. and Mayeda T. K. 1999. *Geochimica et Cosmochimica Acta 63*:2089-2104. [3] Simon S. B. and Grossman L. 2004. Chondrites and the Protoplanetary Disk. pp. 185-186. [4] MacPherson G. J. and Davis A. M. 1994. *Geochimica et Cosmochimica Acta 58*:5599-5625.