CHELYABINSK: AN ORDINARY CHONDRITE
FROM A SPECTACULAR FALL IN RUSSIA.
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Introduction: The asteroidal explosion that occurred over
Chelyabinsk, Russia on Feb 15, 2013 was the first-witnessed oc-
currence that caused significant damage to humans and their
properties. The bolide responsible for this extraordinary event
was estimated to be 17-20 m in diameter, traveling at a speed of
~18 km/s. Although it coincided with the fly-by of 2012DA14 (a
~45 m asteroid), the Chelyabinsk bolide has been estimated to be
derived from the main asteroid belt [1]. Here, we report our
study of two pieces of this meteorite, both completely covered by
fusion crust and amounting to a total mass of ~5 g.

Results: We prepared three thin sections from one ~2.5 g
fragment. The other 2.7 g piece was crushed and is being used
for ongoing determination of bulk-rock geochemistry and spec-
tral reflectance data, some of which will be presented at the con-
ference. These thin sections display relics of chondrules of dif-
terent textures, including barred olivine (BO), radial pyroxene
(RP), porphyritic olivine, and/or pyroxene (POP), and cryptocrys-
talline chondrules with diameters up to 5 mm. The boundary of
smaller chondrules is diffusive. Individual olivine and diopside
fragments are also common in the sample. Large metal and sul-
phide grains contain olivine and albite, and appear to reside be-
 tween chondrules. The matrix in chondrules and between chon-
drules is crystallized.

Silicate minerals are remarkably homogenous with composi-
tions of: Fo71.0 ±0.4 for olivine, En34.7 ±0.3Wo1.4 ±0.2 for orthopyrox-
ene, En46.4 ±0.5Wo45.1 ±0.9 for diopside. The matrix compositions
are largely albitic (Ab83 ±4Or6 ±3), but K-rich compositions are
also observed (Ab44-42Or56-47). Accessory minerals include il-
menite, chromite,apatite, merrillite, Fe and FeNi metals (kama-
cite, taenite), and troilite. Taenite grains often contain Fe, Cu,
troilite, phosphide, and possible lawrencite (FeCl3), which quick-
ly oxyhydrated to akaganéite, probably from terrestrial water
vapor.

Based on the mineral compositions, abundances, and the tex-
ture, this sample represents an equilibrated, LL4-5 ordinary
chondrite, similar to other LL4-5 finds/falls [2]. The parent body
of Chelyabinsk has been estimated to be part of the Apollo aster-
oids [1]. Chelyabinsk therefore offers new insight into the com-
position and nature of this group of Near Earth Asteroids (NEAs).

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