Croste di fusione delle meteoriti

tracce dell'impatto dei meteoroidi con l'atmosfera

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PRISMA

Croste di fusione

Pellicole di materiale nero che rivestono le meteoriti

Auckland (2003)

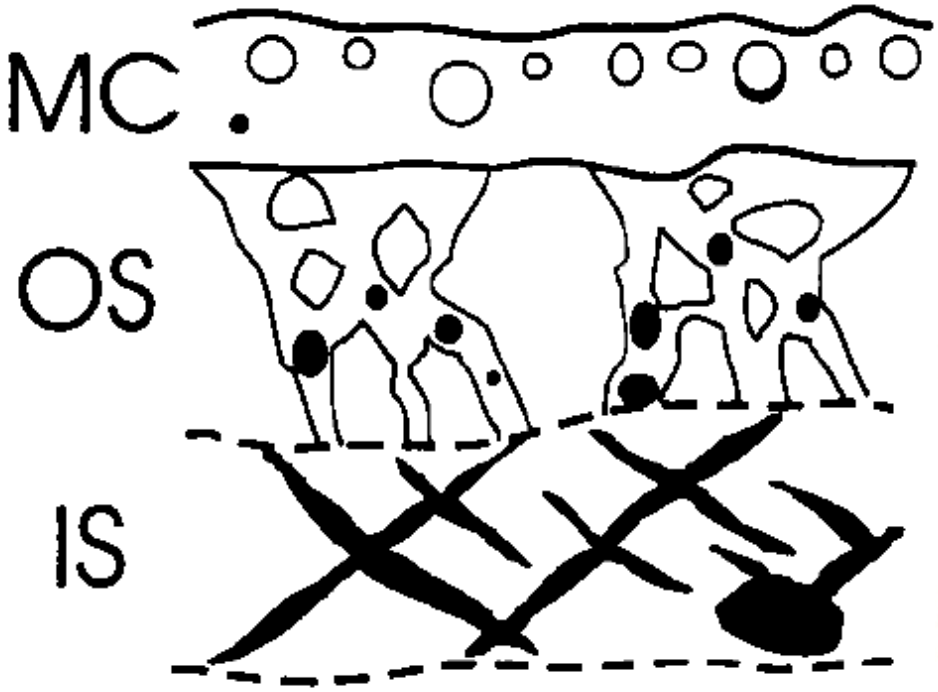
Peekskill, USA (1992)

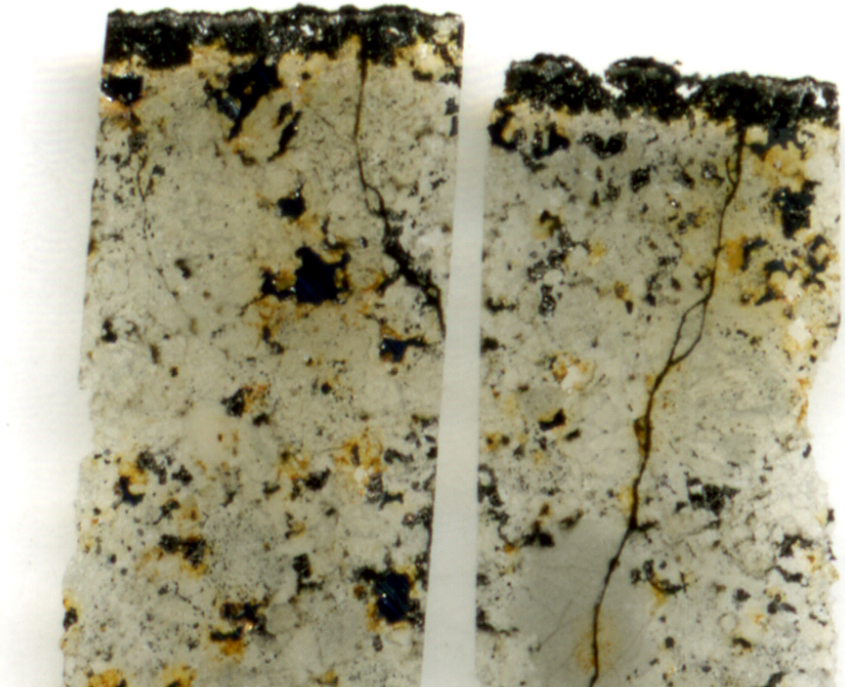
Croste di fusione

La composizione delle croste di fusione riflette grossolanamente quella delle rispettive meteoriti, con **differenze** e **disomogeneita'** Genge & Grady (1999), Thaisen & Taylor,(2009)

Pochi articoli sulle croste di fusione:

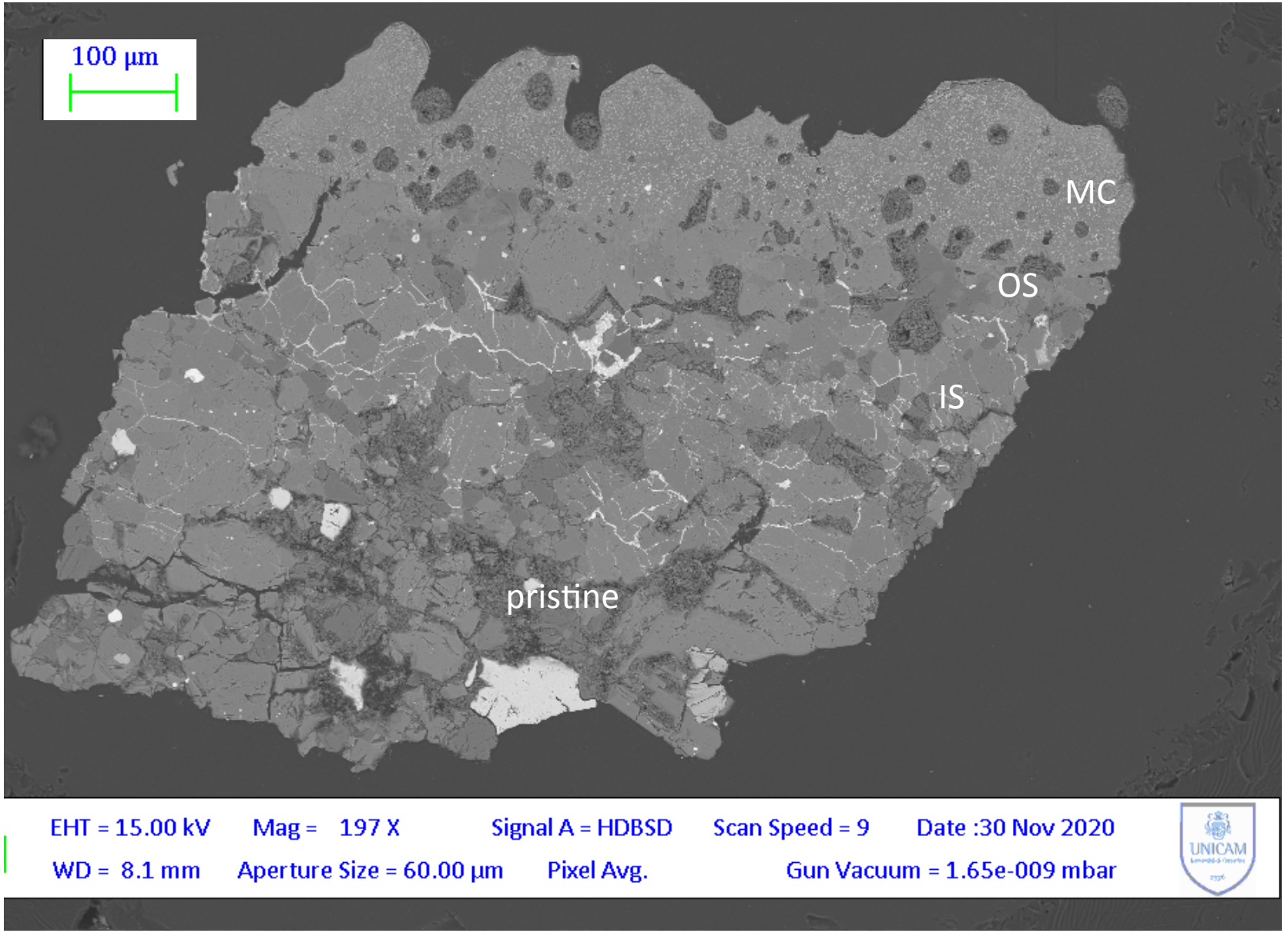
Genge & Grady (1999) the fusion crusts of stony meteorites: implications for the reprocessing of extraterrestrial materials, Meteoritics and Planetary Sciences, 34, 341-356





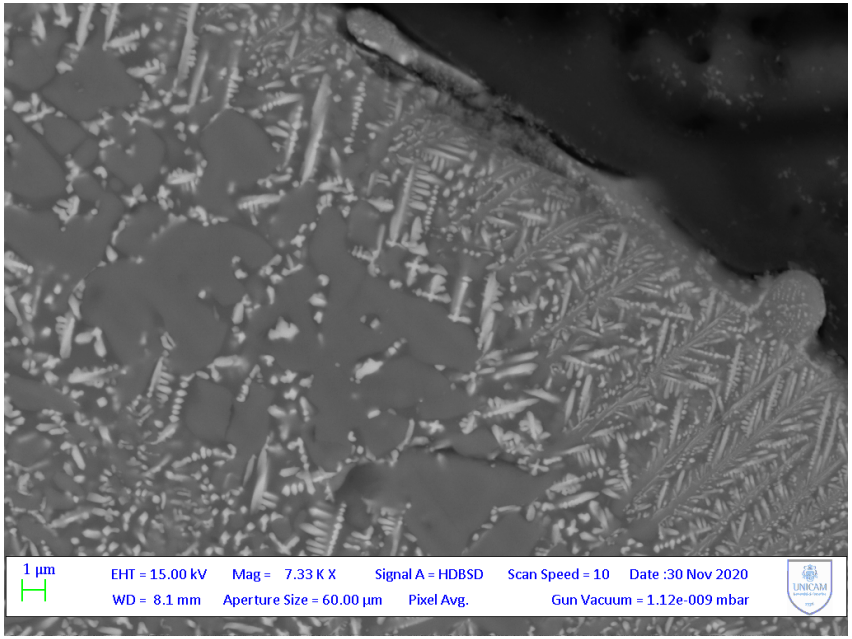
Kabo H5

Croste di fusione

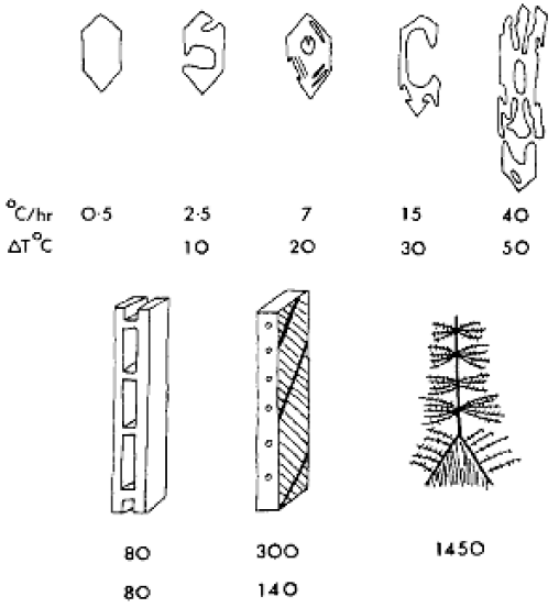


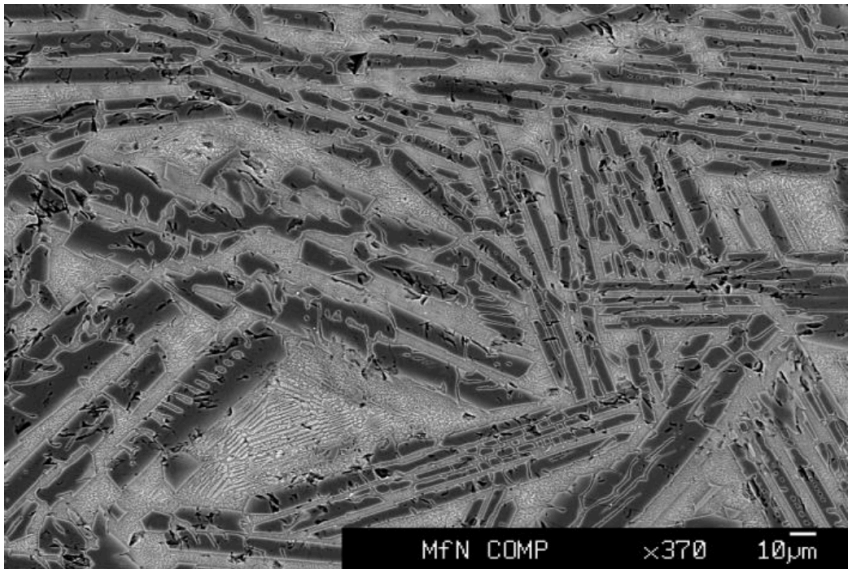
Cavezzo main mass

Morfologia delle olivine Faure et al. (23003)

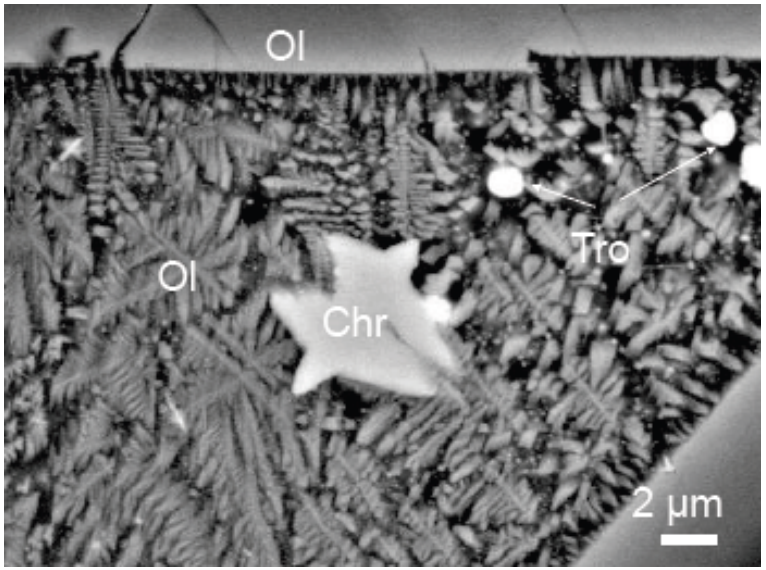


Cavezzo



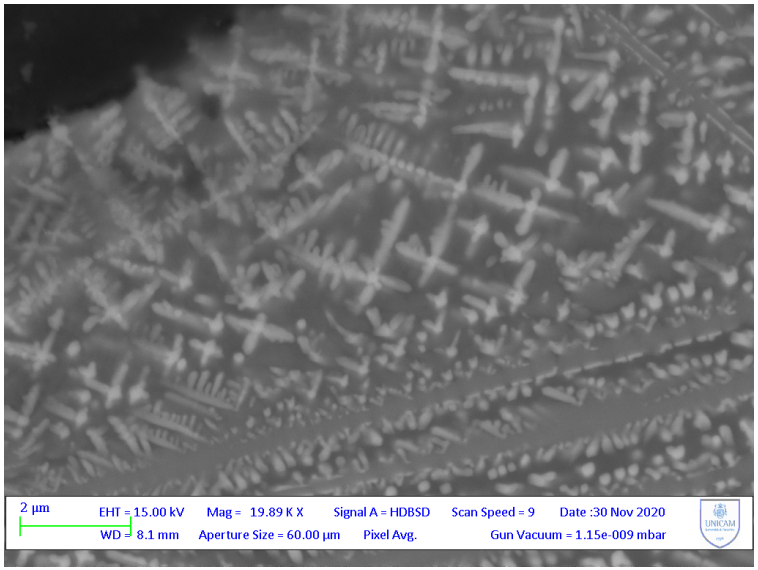


ALH12006



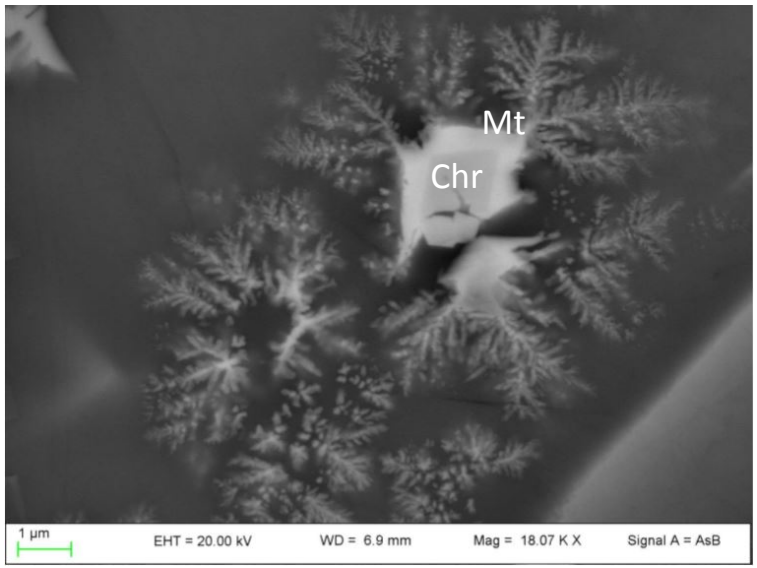
El Hammami sinthetic crust

Nuove fasi Minerali del gruppo degli spinelli



Cavezzo

Chr	$Fe^{2+}Cr^{3+}_2O_4$
Mt	$Fe^{2+}Fe^{3+}_2O_4$
Mg-ferr	$Mg^{2+}Fe^{3+}_2O_4$



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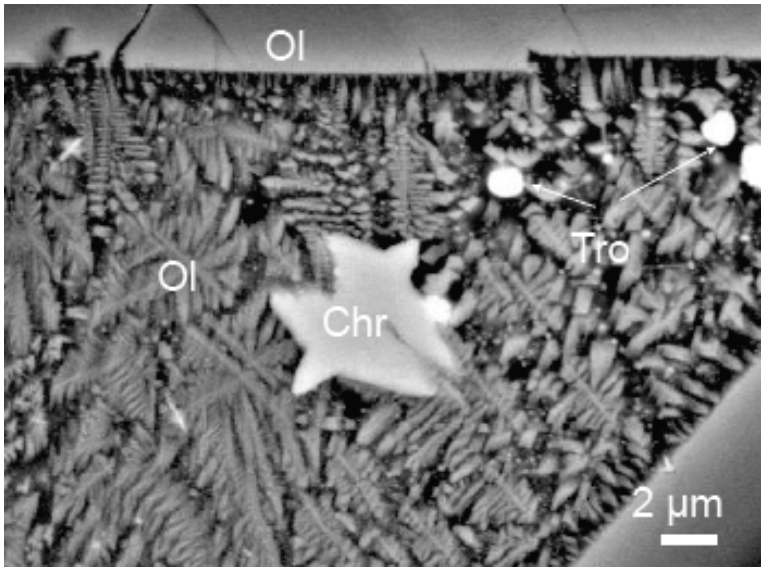
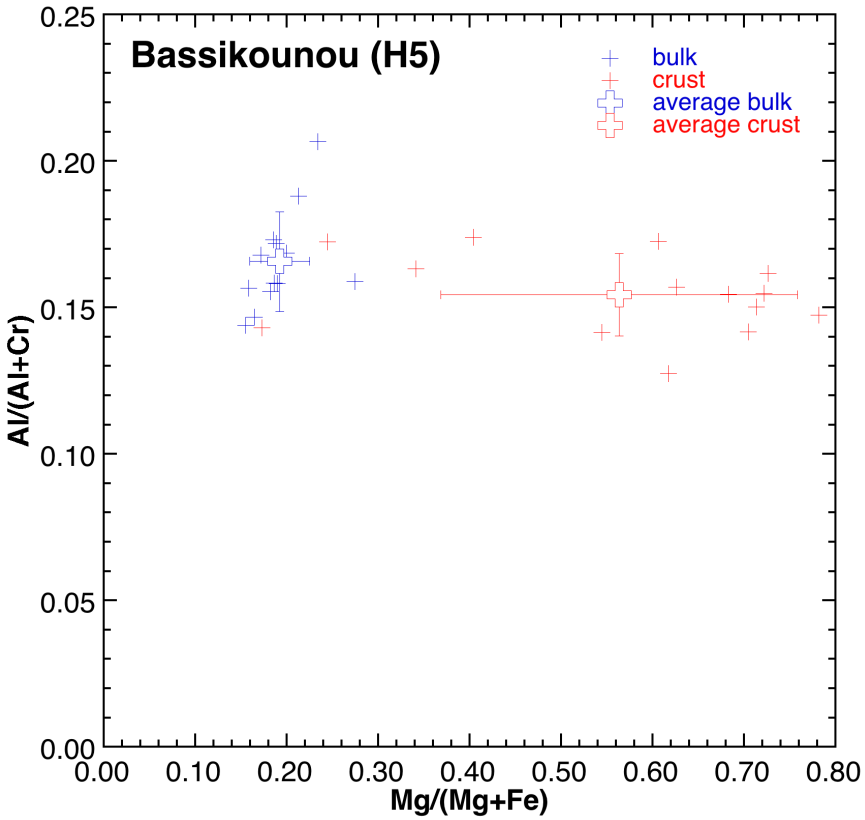
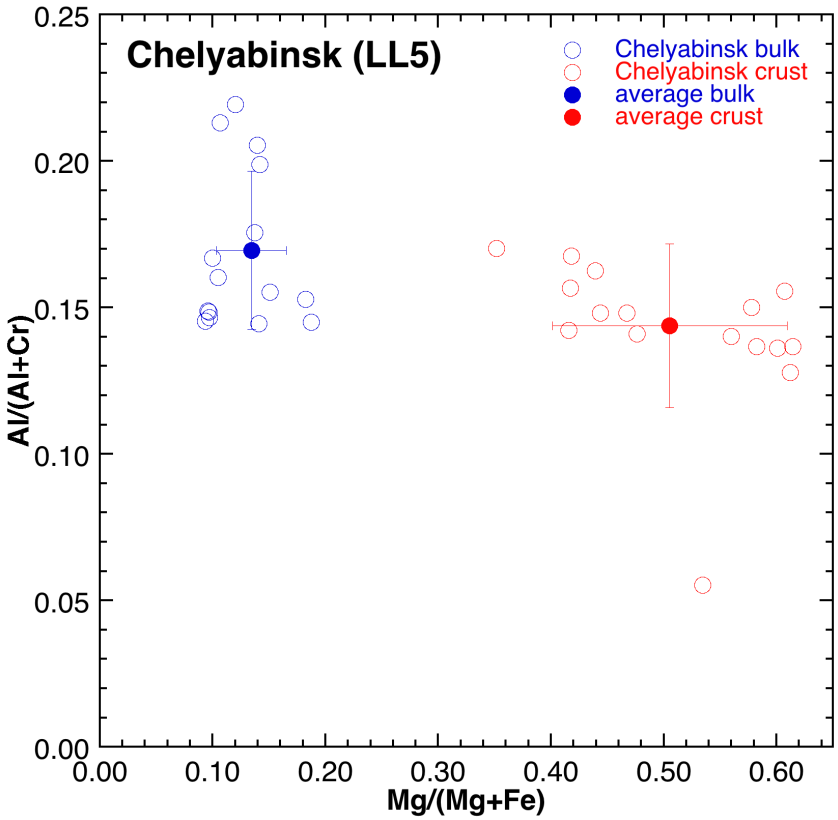


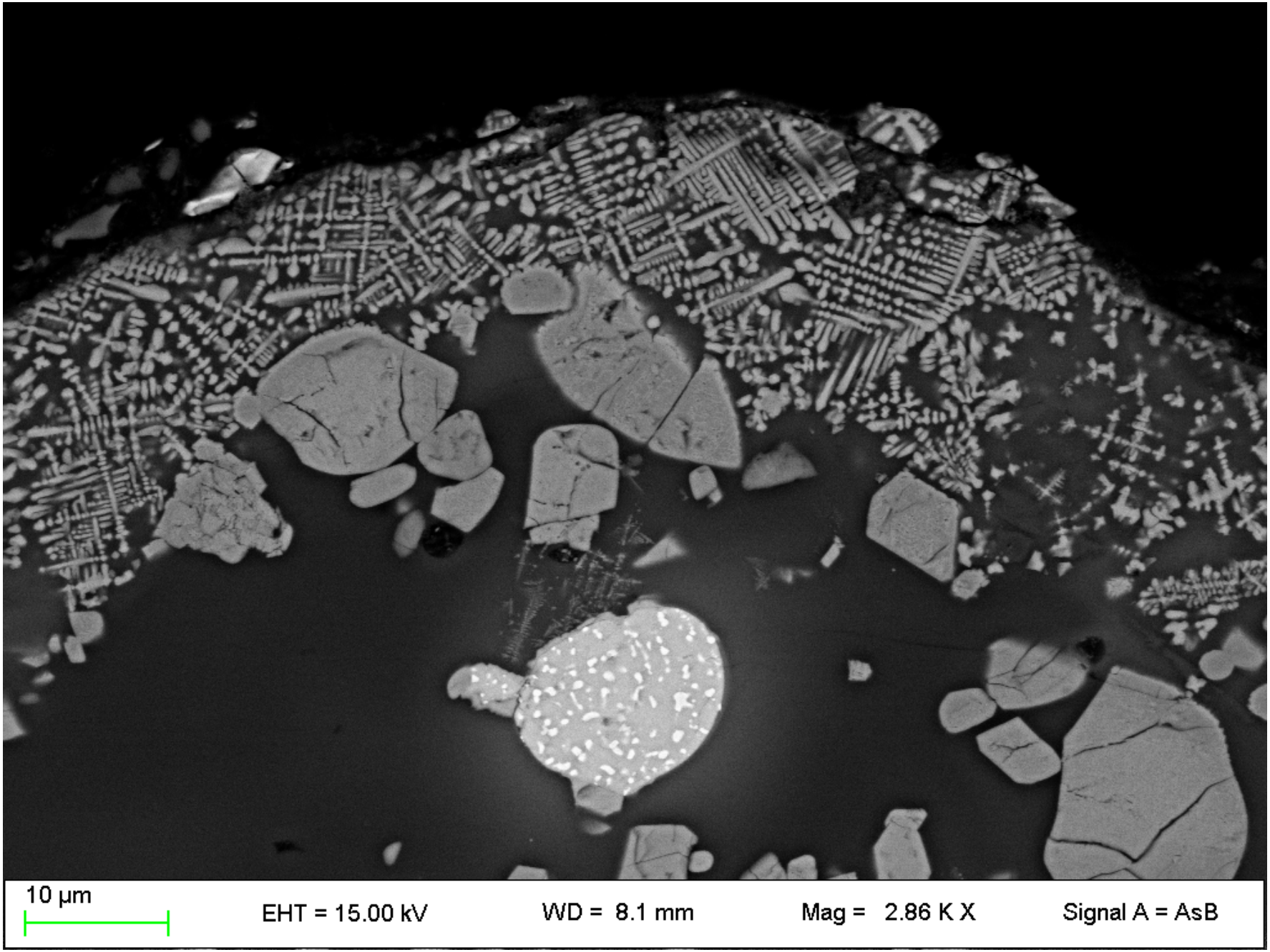
El Hammami sinthetic crust

Chr $(Fe,Mg)(Cr,Al)_2O_4$

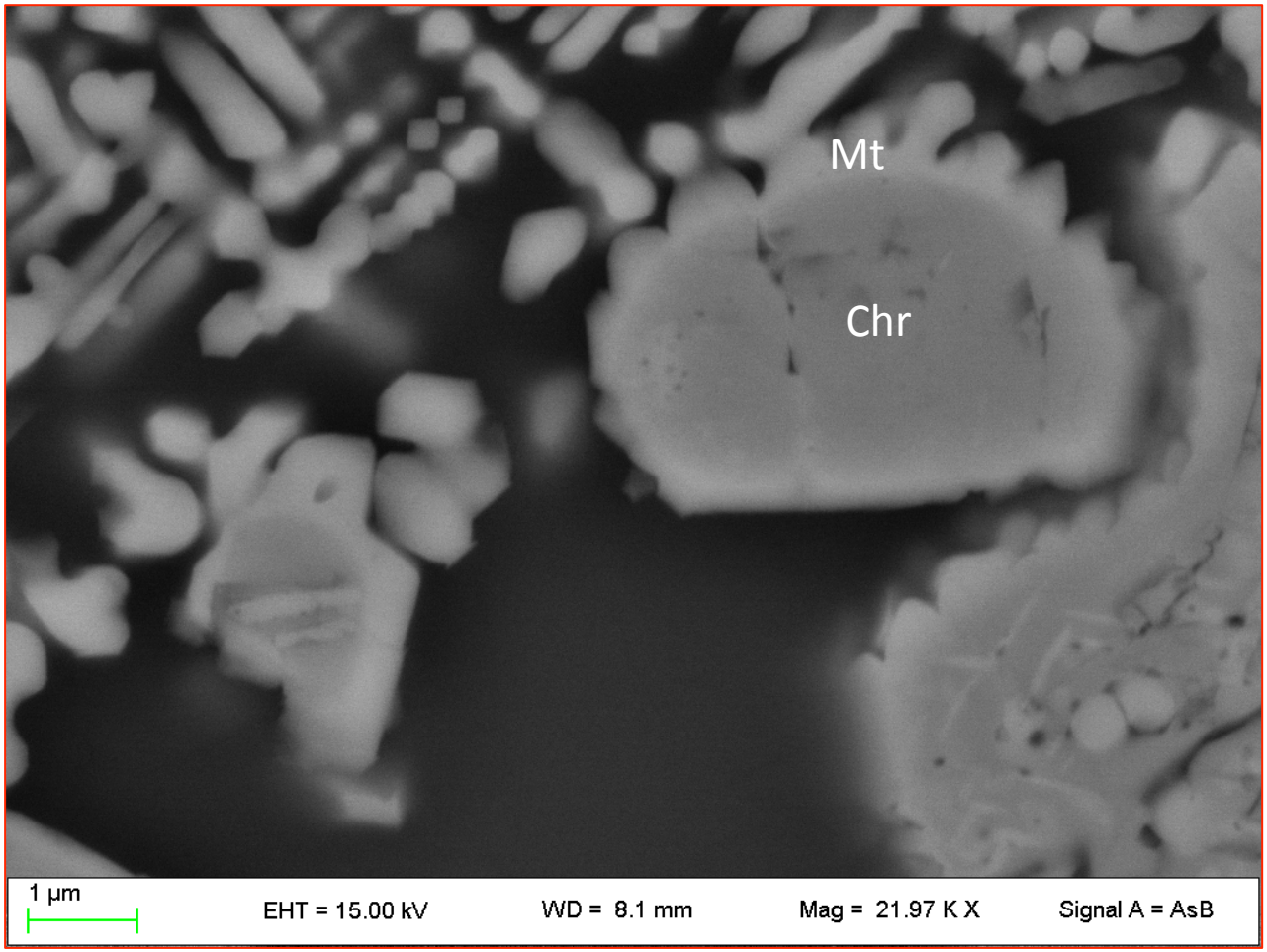
Mg# Mg/(Mg+Fe) Al# Al/(Al+Cr)







Kabo H5



T

Olivina

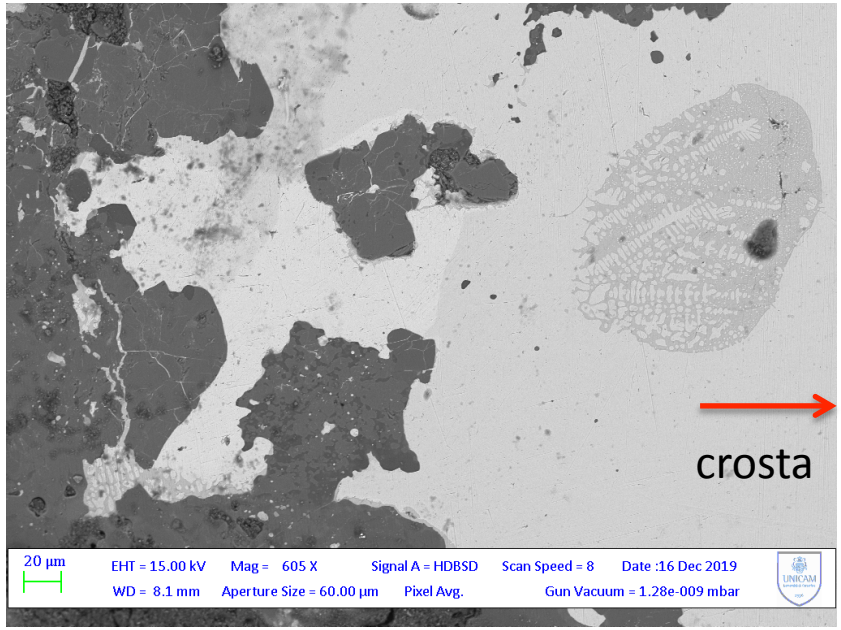
Cromite

magnetite

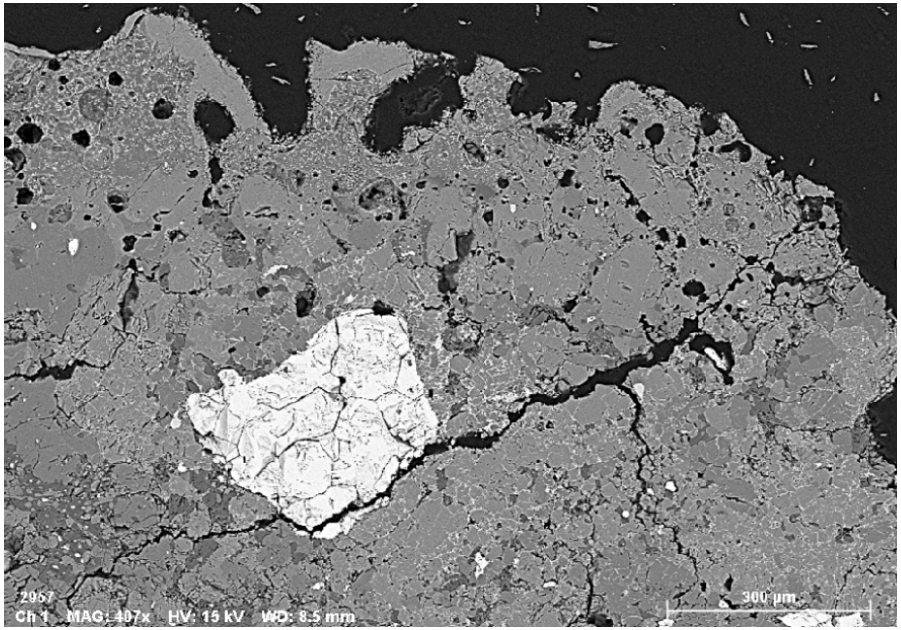
A che temperature sono sottoposte?

Non lo sappiamo!

Le tessiture Fe-FeS, e le vene di solfuri misti a metalli, suggeriscono T>988 °C fino a poche centinaia di micrometri al di sotto della crosta

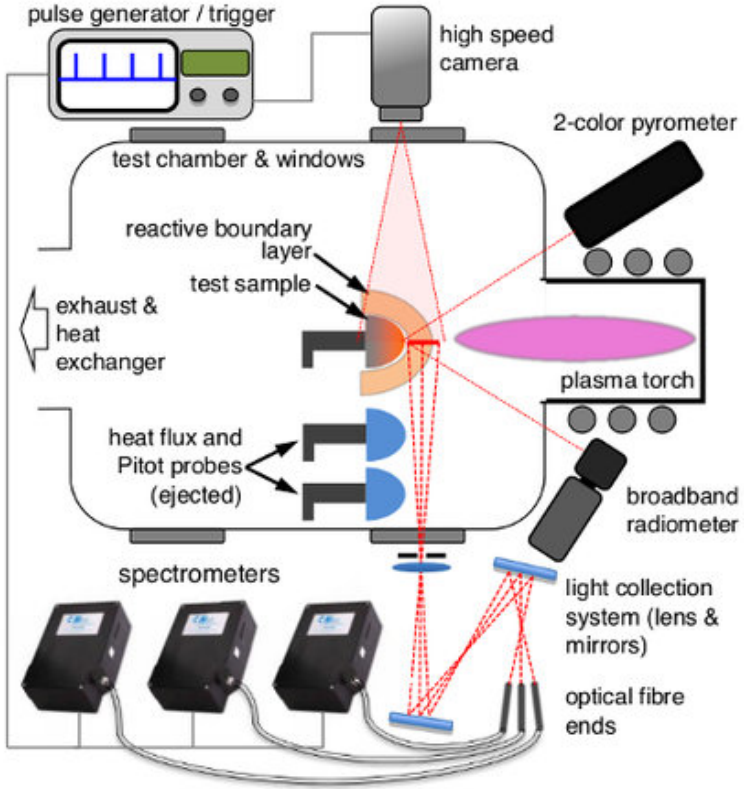


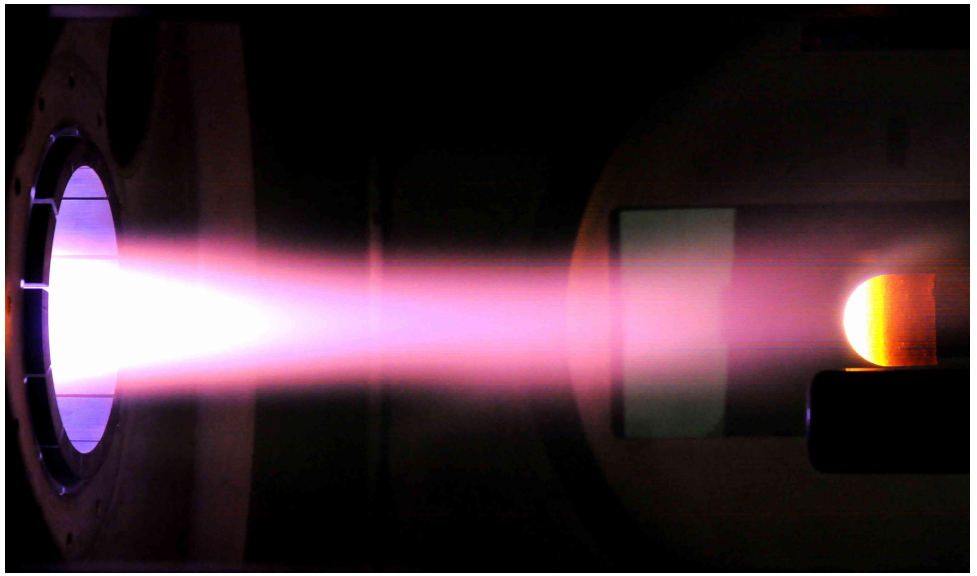
Chergach H5



Chelyabinsk LL5

Dalla Natura al Laboratorio





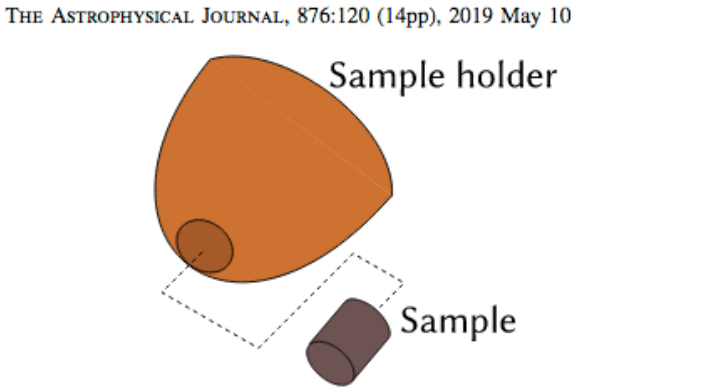
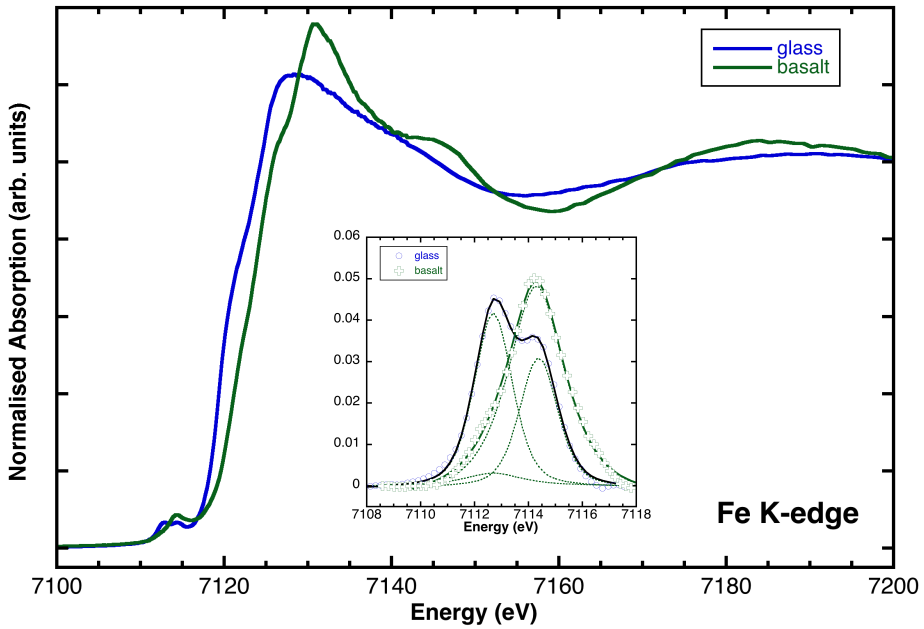


Figure 2. Schematic of the sample and its cork holder. The material sample (ordinary chondrite or alkali basalt), 16 mm in diameter, is embedded in the sample holder in a stagnation point configuration.

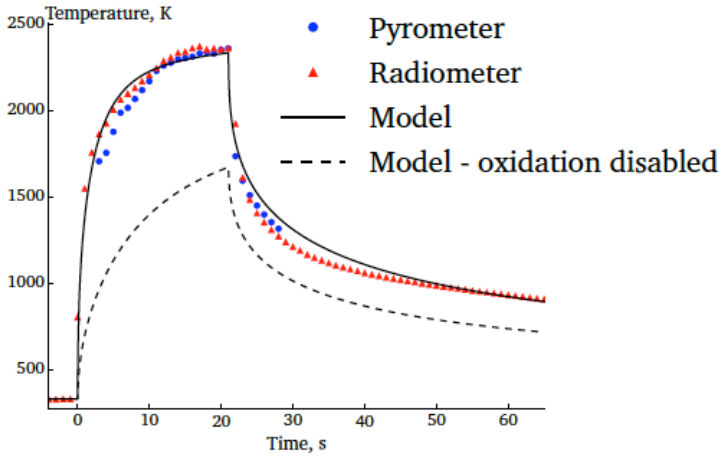
Pittarello et al. (2019) Icarus 331, 170-178;

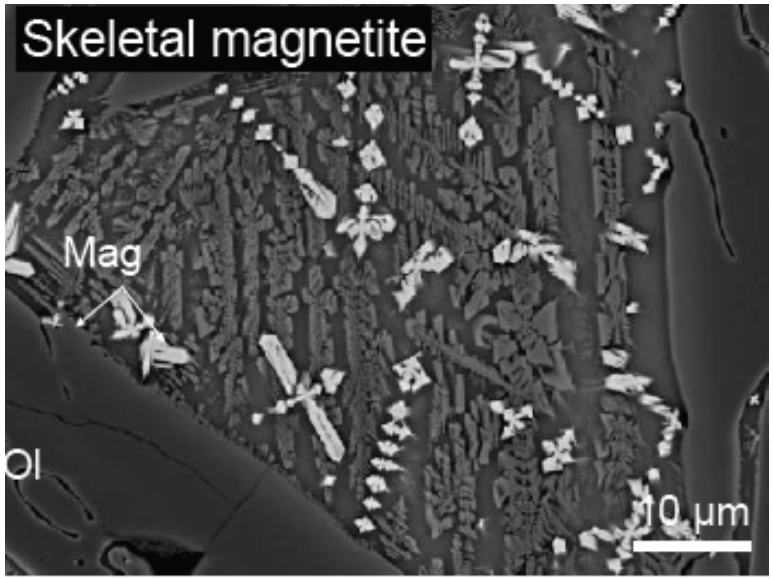
Helber et al.(2019) Astrophys. J, 876, 120-133

Basalto naturale fuso



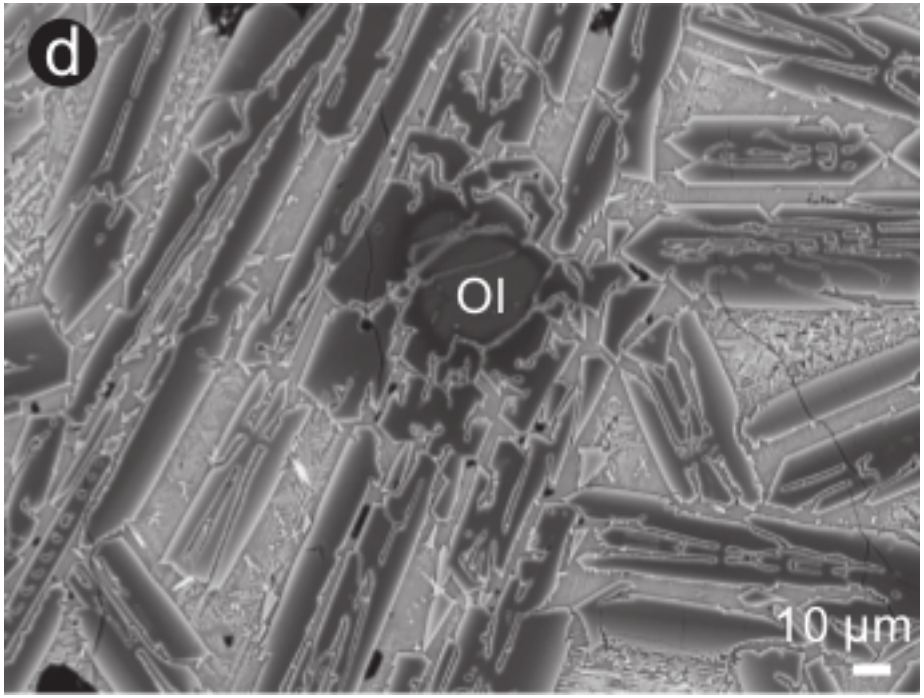
Meteorite fusa

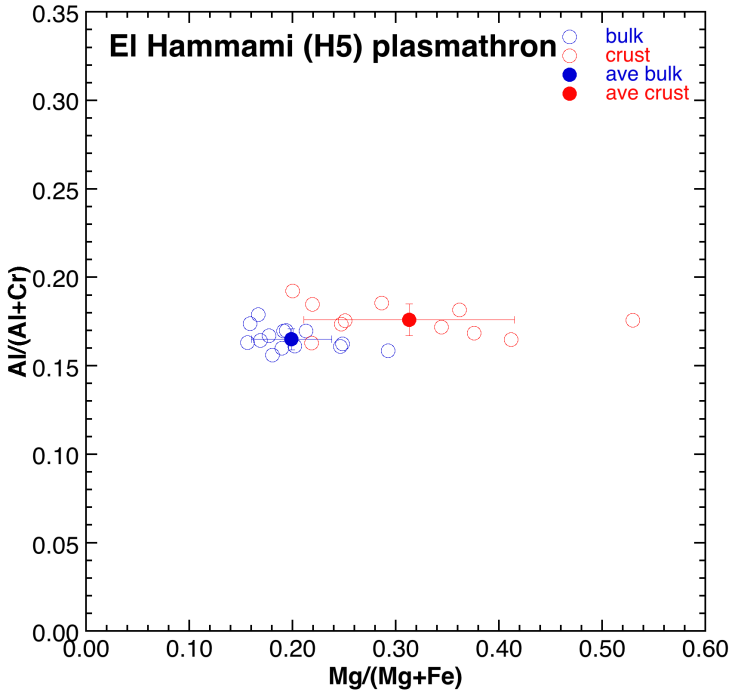


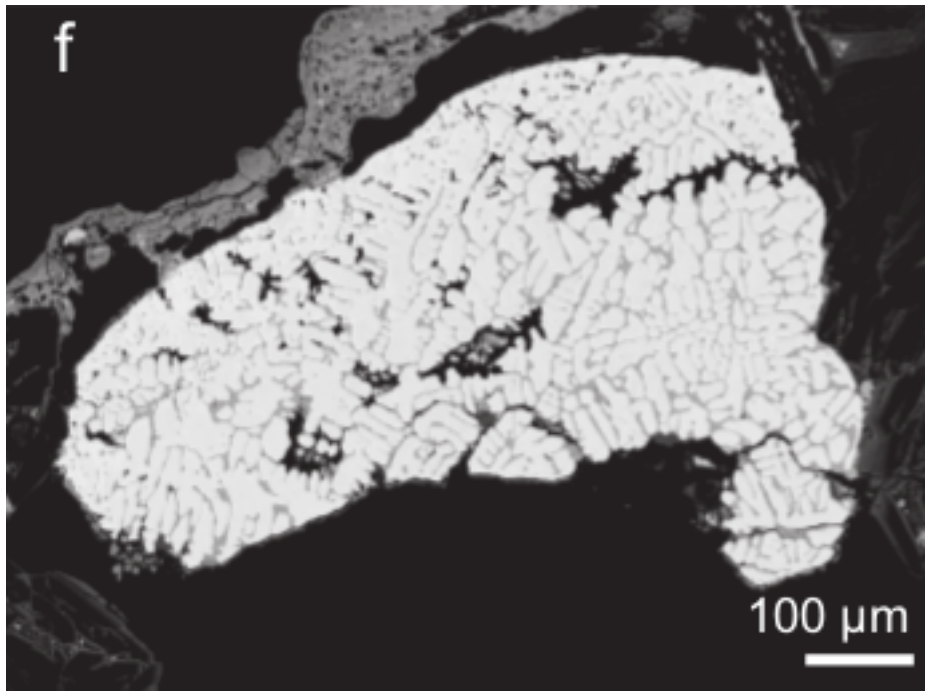


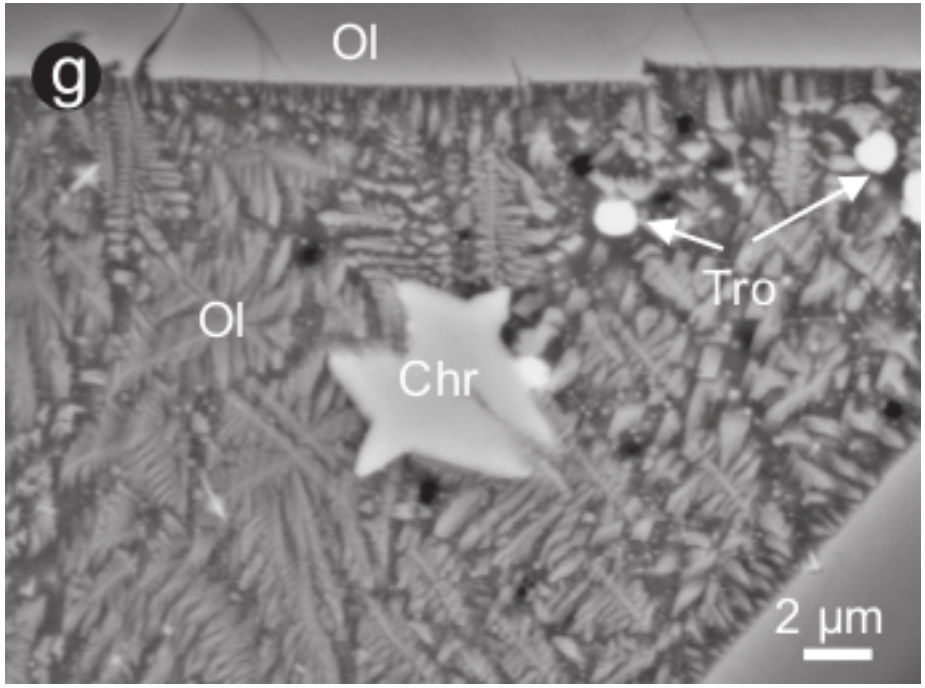
$Fe^{3+}/(Fe^{2+}+Fe^{3+})$ 0.11-0.17 ±0.05

Pittarello et al. (2019) Icarus 331, 170-178;


d
Ol
10 µm


El Hammami (H5) plasmathron
bulk
crust
ave bulk
ave crust
Al/(Al+Cr)
Mg/(Mg+Fe)
0.00
0.05
0.10
0.15
0.20
0.25
0.30
0.35
0.00
0.10
0.20
0.30
0.40
0.50
0.60


f
100 µm


g
Ol
Ol
Chr
Tro
2 µm

Conclusioni

•le croste di fusione registrano la complessa storia del passaggio dei meteoroidi in atmosfera

•Un'accurata caratterizzazione mineralogica (Ni^{Ol}/Ni^{fuso}, $Fe^{3+}/(Fe^{3+}+Fe^{2+})$, tessitura puo' aiutare a decifrarla

•Esperimenti di Laboratorio possono riprodurre le croste di fusione, e forniscono importanti vincoli sui processi in atto durente la fase ablativa

•Lo studio delle croste di fusione puo' avere ricadute sia in ambito tecnologico, sia per lo studio di sferule di ablazione, micrometeoriti, spinelli negli strati impattoclastici

•E' estremamante importante sia studiare croste di meteoriti "fresche" sia continuare a fare esperimenti di laboratorio

Grazie per l'attenzione!

Perseid seen from ISS (2009)