Abstract Submission

P2_08

T2 - Planetary interiors
Mineralogy at extreme conditions in Earth and other planets

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Subsolidus coesite formation in ejecta from Kamil crater and the Australasian strewn field
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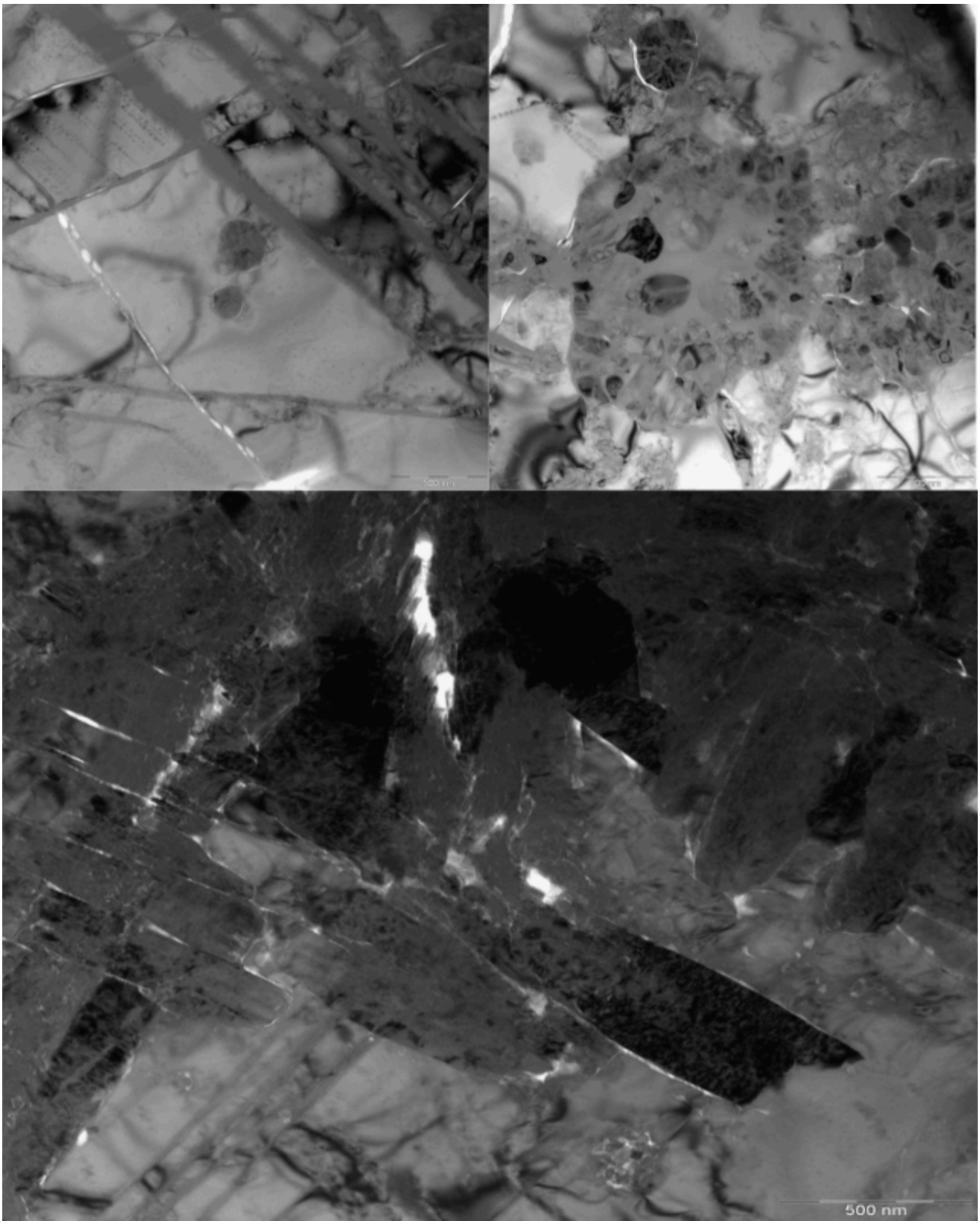
Abstract Content: Impact coesite is generally considered a retrograde product formed during pressure release by the crystallization of an amorphous phase. Our recent TEM study, performed on impact ejecta from Kamil crater and the Australasian tektite strewn field, suggests a different coesite formation pathway through subsolidus quartz-to-coesite transformation (Campanale *et al.* 2021). In Kamil ejecta we found rounded single-crystal coesite domains of 200 nm or less (Fig. up-left). These domains are surrounded by shocked quartz, without any amorphous phase in-between. We also observed larger coesite domains. The larger the domains, the more they appear fragmented and progressively dispersed and resorbed in amorphous silica (Fig. up-right). Our observations suggest that coesite seeds nucleate and grow inside quartz during pressure uploading, probably favored by shock-wave reverberation. Later, when pressure is released and temperature is still high, coesite domains fragment and melt. In impact ejecta from the Australasian tektite strewn field, we again observe coesite crystals embedded in shocked quartz. Coesite crystals have well-developed euhedral habits, which grow at the expense of neighboring quartz, and appear to postdate PDFs and other planar microstructures (Fig. down). In both ejecta, 3D electron diffraction reveals coesite grains displaying a recurrent crystallographic relation with quartz, with (010) coesite plane parallel to {10-11} or {-1011} of quartz. Such evidence suggests a topotactic relation between shocked quartz and impact coesite. Remarkably, both samples experienced relatively fast cooling, which preserved a rock texture only slightly altered by post-impact melting.
Image:



References: Campanale *et al*. 2021, *Sci. Reports*, **11**, 16011.

Disclosure of Interest: None Declared