

## Nanoscale structural complexity of Canyon Diablo diamond

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Canyon Diablo meteorite impacted about 50,000 years ago and formed the Barringer Crater in Arizona (USA). The meteorite is an iron octahedrite that underwent shock metamorphism during terrestrial impact. A unique feature is the occurrence of black diamond (Fig. 1), which formed through shock-induced transformation of graphite or cohenite (Lipschutz and Anders 1961).

Here we study these diamonds using high-resolution transmission electron microscopy (HRTEM) in order to better understand their structure and formation conditions. We show the grains consist of diamond, lonsdaleite (hexagonal diamond polytype), and graphite. Our HRTEM images reveal the carbon allotropes are intimately associated on the nanometer scale. In our presentation we will present causes of the structural complexity in relation to different mechanisms during diamond formation and shock metamorphism.

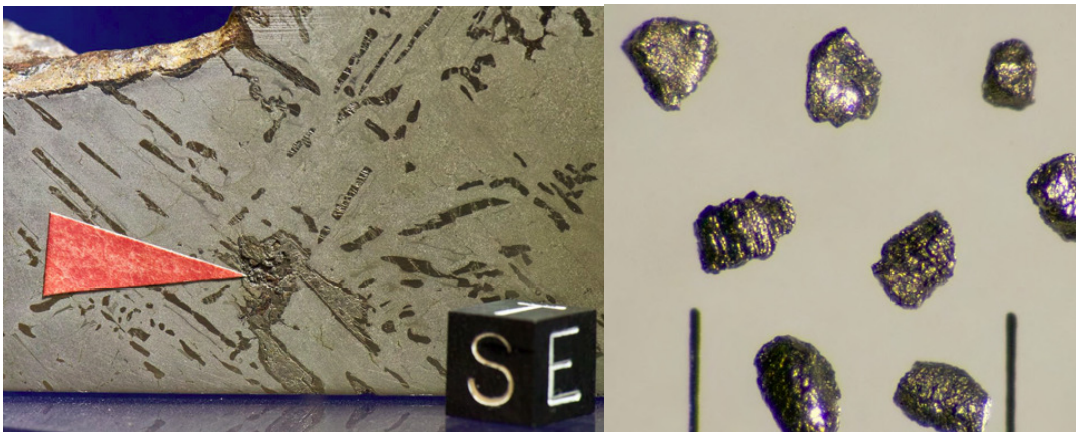


Figure 1: Polished section of Canyon Diablo meteorite with region containing black diamond indicated by the red arrow (specimen ASU34.364) and individual diamond particles. Scale cube and distance between scale markers are 1 cm and 1 mm, respectively.

Lipschutz, M. and Anders, E. (1961) The record in the meteorites-IV: Origin of diamonds in iron meteorites. *Geochimica et Cosmochimica Acta*, 24, 83-105.