

Corundum within silicate/graphite inclusions in Iron meteorite .

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According to the equilibrium thermodynamic condensation calculations for a cooling solar gas, corundum is the first major condensate to form in our solar system [1]. Occurrence of corundum (Al_2O_3) within inclusions of silicate/graphite in Iron meteorite, Bhuka (IAB low-Ni ungrouped), is highly unusual [2]. Silicate inclusions with various phase assemblages (phosphate, pyroxene, glass, feldspar etc) are common feature of type I AB and IIE Iron meteorite, but the texture and constituent phases of the inclusions vary from one meteorite to another [3]. These variations probably are indicative of various stages of alteration of the chondritic material which contributed to the origin of the meteorite. Evidence from Hf–W radiometric dating of CAIs and calibrating against iron meteorites shows that most irons come from bodies in which metallic cores formed <1 Myr after the growth of the oldest objects, Ca–Al-rich inclusions in chondrites [4]. Group IAB also have poorly defined elemental trends suggesting that the group did not form from a single isolated metallic melt and their formation might be due to impacts mixed molten metal and silicates [3].

The Al-Mg systematics in corundum from the silicate/graphite inclusions of Bhuka meteorite has been initiated to understand the relative formation time and the constraint offered towards the processes that forms group IAB iron meteorites. PRL Nano Secondary Ion mass spectrometer (NanoSIMS) measurements on four of these corundum grains were performed with a 2x 2microns raster and analysing Mg isotopes along with Al in multi collection mode. Grains provide with an initial value of $(^{26}\text{Al}/^{27}\text{Al})_i \sim 5 \times 10^{-5}$ indicating an early condensates mixing into the iron melt. Probably, the parent body of the iron meteorite that was disrupted to form meteorite had a very primitive chondritic composition component with large number of corundum inclusions in closed system.

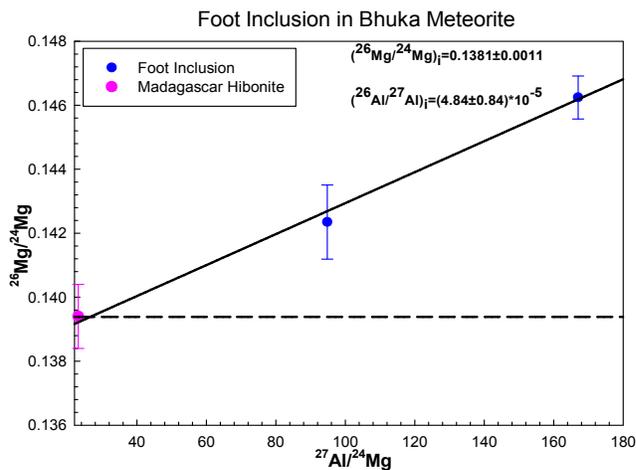


Figure: Three Isotope plot for Al-Mg isotopic systematics from corundum grains from one of the inclusions named "foot inclusion" from Bhuka meteorite.

Meteorites Names: Bhuka meteorite (Low Ni, IAB-ungrouped)

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