Talk at Splinter Meeting

Splinter F

Oddballs in Meteorites

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Formation of solids from the gas phase is a complex process, which depends upon chemical properties, environmental conditions and availability of elements. Hence, "chemical oddballs" in primitive solar system matter such as meteorites are difficult to impossible to be recognized by chemical composition (alone). Isotopic compositions, though, reveal that meteorites contain small amounts of stardust formed in the outflows of late-type stars and in supernova ejecta. Several of these are - naturally - also chemically peculiar. In particular, silicon carbide and graphite grains from AGB stars show not only in their isotopic composition, but also in the elemental abundance pattern of the heavy elements the signature of the s-process. A small fraction of refractory metal nuggets, although not yet isotopically characterized, may show a similar s-process abundance pattern of the platinum-group elements, which in solar system abundances are dominated by the r-process contribution. For silicon carbide and graphite grains likely to have a supernova (SNII) origin, on the other hand, isotopic analyses of heavy elements are rare, but the results are puzzling, and do not conform to compositions derived for r-process matter, by subtracting the s-process contribution from the solar system abundances. While this is similar to the case of krypton and xenon in nanodiamonds, the situation in the latter seems even more enigmatic.