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# Analysis of trace elements in iron meteorite by secondary ion mass spectrometer

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The iron meteorites are considered as a part of core in the parent body. These are divided in several classes by the chemical bulk composition and the structure of the Widmanstatten pattern. The Widmanstatten pattern is the characteristic structure in the iron meteorite. The Widmanstatten pattern formed by growing of kamacite (Ni: about 6wt%) phase in taenite (Ni:above 6wt%) phase during cooling of the parent body. The bandwidths are reflected by the parent body size of the iron meteorite. Size of the Widmanstatten pattern also depends on P in the iron meteorite (Narayan et al, 1985)

In this study two iron meteorite has been measured. One is Canyon Diablo belonging to IAB (Ni: 6.5-8.5wt%) by chemical bulk composition and og (kamacite bandwidth: 1.3-3.3mm) by the pattern of the Widmanstatten structure. Another is Gibeon belonging to IVA (Ni: 7.8-13wt%) by chemical bulk composition and of (kamacite bandwidth: 0.2-0.5mm) by the pattern of the Widmanstatten structure. We observed these meteorites by a scanning electron microscope(SEM-EDS) first, and then using a secondary ion mass spectrometry (SIMS, CAMECA ims 3f) at Tokyo Institute of Technology. We used O2+ as the primary ions . These spot size were 20-30 micrometer in diameter, primary accelerating voltage was 15 kV and secondary accelerating voltage was 4.5kV.We used the NIST SRM662 metal as standard to determine concentrations of trace element.

In the both iron meteorites, the taenite band has 23-27wt% in Ni content, and 80-100ppm in P content. Kamacite has 6-7wt% in Ni content, and 11-12wt% in P content. One of the taenite band in the Canyon Diablo includes a phosphide.

The P content in the taenite band were 11-12wt%, and Ni content were 26-31wt%. Bulk concentration of P in Canyon Diablo is 0.25wt% (Jochum et al, 1980). According to phase diagram (Narayan et al, 1985), phosphide isn't crystallized in the alloys for this concentration. Ni bulk composition in Canyon Diablo was 7wt% (Jochum et al, 1980). Therefore Ni content of the taenite band including phosphide is enriched in 4 times comparing with bulk composition. Kamacite contains up to 500ppm in P. If taenite contains P content more than 500ppm before kamacite crystallization P. P is concentrated in residual taenite phase and phosphide can crystallize in the taenite. Therefore we estimated that P content of taenite before the kamacite crystallization was about 3wt%. This estimation is about 4 times greater than bulk P composition of Canyon Diablo. These results indicate that P distribution was highly heterogenous in the Canyon Diablo parent body in micro scale.