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**Metal-related mineral assemblages as probes into  
protoplanetary gas-solid interactions – first  
experimental results.**

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Sulfide-magnetite-(nitride) assemblages in unequilibrium C-type chondrites most likely resulted from the reaction of Fe-rich metal grains with H<sub>2</sub>O, H<sub>2</sub>S and other volatile species, which could have been released from evaporated ices [1,2].

In order to experimentally explore these interactions in terms of reaction kinetics and mineral microstructures a low-pressure gas-mixing furnace was constructed. Current experiments concentrate on the reaction of H<sub>2</sub>/H<sub>2</sub>O gas with Fe(+Ni,Co,Cr) metal at pressures of ~10 mbar and temperatures between 250 and 600 °C. FIB-SEM and TEM protocols have been developed to quantify the amount of magnetite formed and to characterize the microstructures and reaction mechanisms. Magnetite forms octahedral crystals, skeletal crystals and high aspect-ratio whiskers. Porosities of the reaction products range between <1 % and >50 % (compact layers to extremely fluffy aggregates).

*We acknowledge support by the DFG within the SPP 1385.*

[1] Ciesla, F.J. et al. (2003) Science 299, 549–552. [2]

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Harries et al. (2015) Nature Geosci. 8, 97–101.

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Cite abstract as:

Harries, D., Barth, M.I.F. (2015) Metal-related mineral assemblages as probes into protoplanetary gas-solid interactions ? first experimental results. Paneth Kolloquium, Nördlingen (Germany), abstract URL: <http://www.paneth.eu/PanethKolloquium/2015/0032.pdf> (abstract #0032).