MIXING AND VOLATILE DEPLETION IN THE EARLY SOLAR SYSTEM

Mark Rehkämper

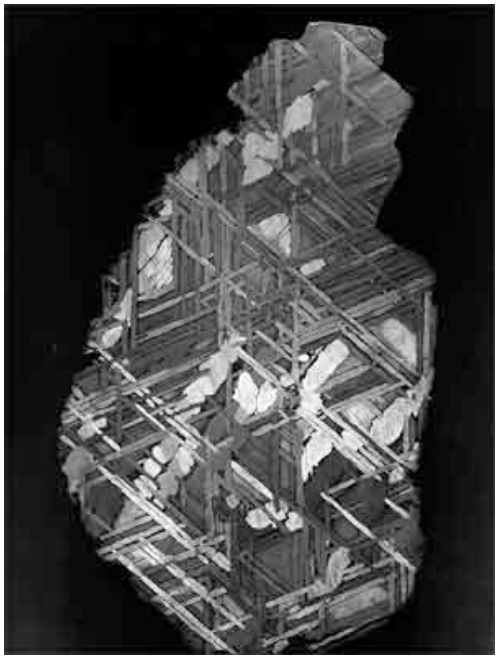
Mass Spectrometry and Isotope Geochemistry at Imperial College London

This project addresses some of the most basic questions of planetary science – How well was the material of the solar system mixed when the first planetary bodies formed? Why are the Earth, Moon, Mars and most asteroids so depleted in volatile constituents? How and when did the Earth acquire its budget of volatile elements? In the last years, new developments in modeling and analytical techniques have significantly improved our knowledge such early solar system processes but overall the understanding remains patchy and many issues are hotly debated.

This project encompasses trace metal concentration and isotope analyses by MC-ICP-MS (multiple collector inductively coupled plasma mass spectrometry), which will shed new light on these questions. Depending on the exact interests of the student, the PhD research will focus on individual or coupled analyses of zinc, cadmium, molybdenum, tellurium, lead and thallium isotope compositions for various meteorite types and meteorite constituents, such as CAI's and chondrules, as well as terrestrial samples.

As such, the project involves significant hands-on analytical research in the *MAGIC Laboratories* at the Department of Earth Science & Engineering of Imperial College London (see http://www.imperial.ac.uk/earth-science/research/research-groups/magic/). This includes sample preparation in the clean room facilities and high-precision isotope analyses with one of our three isotope ratio mass spectrometers.

The project is suitable for a student with a background in geology, chemistry and planetary science, or equivalent experience. Further information about the project can be obtained directly from Mark Rehkamper at markrehk@imperial.ac.uk.



The pictures show polished slabs of an iron meteorite (with the characteristic patterns that form during cooling of the metal) and the Allende chondrite (with CAIs and chondrules visible). Samples of such meteorites will be analysed during the PhD research, as the trace element concentrations and isotope compositions carry a unique record of early solar system processes.