

RAMAN SPECTROSCOPY OF SOME GLASS INCLUSIONS IN CHONDRULES OF ALLENDE. J. Makjanic, R.D. Vis, J.L.R. Touret\*, H. Verheul, Department of Physics and Astronomy, \* Department of Geology, Vrije Universiteit, Amsterdam, The Netherlands.

The detection of carbon in glass inclusions within the chondrules of the Allende meteorite was done with the Raman microprobe. For that purpose a thin section of Allende was first examined optically. All chondrules contained small inclusions (diameter 3-20  $\mu\text{m}$ ), most of them in the core. The most numerous of the inclusions are completely black under the microscope, and others are clear glass. Between these two categories there are all sorts of inclusions, gray, brown and their combinations. Many glass inclusions contain one or more gas bubbles, while some contain also crystals and/or opaque spherules. Three chondrules with the total of 163 inclusions were examined with the laser Raman multichannel microspectrometer at the Geology Department of the Vrije Universiteit. The 514.5  $\mu\text{m}$  Argon green line was used as the excitation source. Inclusions were irradiated through the microscope in the reflected-light mode with high magnifications so that spots with 1-5  $\mu\text{m}$  diameter were examined. Carbon was detected in 47 inclusions, all in form of disordered polycrystalline graphite, restricted to spots usually much smaller than the inclusions. In the Raman spectrum, polycrystalline graphite consists of two lines, whose ratio depends on the degree of orderings of crystals. This ratio varies from inclusion to inclusion in our measurements, suggesting different graphite nucleation temperatures (1). Most of the graphite was detected in black inclusions (30 inclusions) while it was furthermore present in gray, black-gray, and glass-with-opaque-spherules inclusions. Clear glass inclusions contained no graphite. Preliminary electron microprobe measurements revealed that clear glass inclusions are indeed silicate glass, while gray, brown and combined inclusions are glass clinopyroxenes. One black inclusion examined has a very heterogeneous composition, including phosphate, magnetite and nickel-iron.

- (1) M. Christophe Michel-Levy, A. Lautie, Microanalysis by Raman Spectroscopy of Carbon in the Tieschitz Chondrite, Nature, Vol. 292 (1981) 321-322