



## Mössbauer Spectroscopy and Electron Microscopy Investigation of the Martian Meteorite Dar al Gani 1037

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The Martian meteorite Dar al Gani 1037 was found in Libya in 1999 and has been classified as basaltic shergottite [1]. Here we present combined Mössbauer and electron microscopy investigation of a sample of the meteorite.

Backscatter scanning electron microscopy reveal large olivine grains ( $\sim 50\text{-}150\ \mu\text{m}$ ) showing fractures and compositional zoning from  $\text{Fa}_{35}$  (centre) to  $\text{Fa}_{45}$  (rim). Analysis of smaller pyroxene grains reveal great compositional diversity, from iron rich orthopyroxenes, pigeonite, and probably some less iron-rich augite. Glassy material between the grains shows composition corresponding to maskelynite and is interpreted as amorphized plagioclase.

The central part of the backscatter Mössbauer spectra can be analyzed in terms of three components due to  $\text{Fe}^{2+}$  in olivine and pyroxenes and mineralogically unspecific  $\text{Fe}^{3+}$ . The pyroxene shows asymmetric broadening of lines, inconsistent with a single type of pyroxene in agreement with the compositional analysis.

The Mössbauer spectra are different from Mössbauer spectra obtained of basalt samples at Gusev Crater by the Mars Exploration Rovers [2]. The results show that Dar al Gani 1037 has formed under fractionated crystallization which also means that it has relatively high amount of mafic minerals.

[1] Sara S. Russel et al., The Meteoritical Bulletin no. 88, 2004 July, *Meteoritics Planetary Science* **39**, Nr 8, Supplement, A215-A272 (2004)

[2] Morris et al., Mineralogy at Gusev Crater from the Mössbauer Spectrometer on the Spirit Rover. *Science* **305** (2004) 833-836.