RUMURUTI CHONDRITE: ORIGIN AND EVOLUTION OF PRIMITIVE COMPONENTS. C. M. Lingemann, J. Berlin, and D. Stöffler, Institut für Mineralogie, Museum für Naturkunde, Invalidenstrasse 43, 10115 Berlin, Germany (cornelia.lingemann@rz.hu-berlin.de).

Introduction: Rumuruti chondrites are genomict breccias containing lithic fragments of petrologic type 3 to 6. Type 3 fragments are of special interest with regard to the origin of the Rumuruti parent body. Although such fragments have been described in various Rumuruti chondrites before [1–3], type 3 lithologies within Rumuruti itself, which is the only fall in this group of chondrites [4], have not been studied in detail yet. We have analyzed these in three thin sections of Rumuruti by the optical microscope, scanning electron microscope and electron microprobe focussing on the silicates olivine and Ca-poor pyroxene.

Observations: Type 3 material is found as lithic and mineral fragments in the matrix of the breccia. Lithic fragments contain unequilibrated large olivine and Ca-poor pyroxene crystals of variable Fe-content (Fa 7–44 mol%, Fs 4–24 mol%) embedded in a porous matrix of predominantly tiny olivine crystals which have a relatively high Fa-content (Fa 46–49 mol%).

Small fragments of these lithologies - mainly mineral clasts - occur in the matrix of the bulk breccia. They contain the same kind of heterogeneous olivine and Ca-poor pyroxene as found in the larger lithic fragments. Some grains are still partially surrounded by a thin rim of Fa-rich olivine crystallites, which represent the matrix of the type 3 lithic fragments. Rarely, isolated fragments of such matrix occur in the bulk matrix of Rumuruti.

In some olivines the Fa-content increases continuously towards the rim, others display a distinct Fa-rich rim. The Ca-poor pyroxenes are heterogeneous in their Fs-content. Some enstatitic pyroxenes are altered into Fa-rich olivine in an outer zone and along fractures and cracks.

Conspicuously, FeNi-metal as well as refractory inclusions except for isolated tiny grains of noble metals and noble metal alloys [5,6] are virtually lacking in the analyzed type 3 material (and in the bulk breccia).

Implications for the Formation and Evolution of the Parent Body: Based on the present observations we infer the following major processes in the history of the Rumuruti parent body: Fe-poor olivine and pyroxene were formed as primary condensates of the solar nebula [7]. Some of these grains reacted with the solar gas upon cooling and acquired the compositional zoning with continuously increasing Fe-content towards the rims [8]. Other grains were obviously exposed to a discontinuous compositional change of the solar gas (increased oxygen fugacity) thereby acquiring discontinuous Fa-rich rims and an alteration of Fs-poor pyroxene to Fa-rich olivine on the surface and along fractures and cracks. If primordial metal was ever present in the feeding zone of the Rumuruti parent body it was oxidized and incorporated into the Fe-rich silicates. However, it cannot be excluded that its absence is due to a low pressure region of the solar nebula in which the Mg-rich silicates were condensated and removed before Fe-metal was formed. The fayalitic olivine grains forming the present type 3 matrix originate probably from the same solar nebula regions of high oxygen fugacity where the Fe-rich reactions rims on the early condensates were formed [9].

After the accretion of these various components which originated from regions of the solar nebula with distinctly different composition, the Rumuruti parent body was exposed to thermal metamorphism and partially transformed to type 4, 5, and 6 lithologies. In a last evolutionary phase, these materials and the primordial type 3 lithology were excavated, transported and mixed by impact processes on the parent body to form the present genomict breccias.

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