OBSERVATION OF COLOURATION OF RINGWOODITE IN THE NWA 5011 L5-6 CHONDRITE. Sz. Nagy[1] (ringwoodite@gmail.com), I. Gyollai[2], S. Józsa[1] and Sz. Bérczi[1]. [1]Eötvös Loránd University of Budapest, H-1117 Budapest, Pázmány Péter sétány 1/c., Hungary; [2]University of Vienna, Department of Lithospheric Research Center for Earth Sciences, A-1090 Vienna, Althanstrasse 14., Austria.

Introduction: Olivine α-$(Mg,Fe)_2SiO_4$ is one of the rock-forming minerals both in the Earth's crust and mantle and in ordinary chondrites [1]. The olivine structure would transform to its high pressure polymorph ringwoodite γ-$(Mg,Fe)_2SiO_4$ in the transition zone by lithospheric pressure, and in the ordinary chondrites by shock metamorphism [2,3]. Ringwoodite is common in and adjacent to melt veins especially in L6-type chondrites (Fig. 1). The NWA 5011 L5-6 chondrite contains abundant shock melt veins network, in which the size of ringwoodite aggregates can reach 500 μm in diameter as well. Because of the "well developed" aggregates size, we could easily observe them in thin section. In this abstract we are doing a proof summarize our observation about the colours of the ringwoodite aggregates, and we propose a possible new idea for the origin of the colorless parts in blue aggregates.

Results and Discussion: The ringwoodite of NWA 5011 has various colour in the investigated thin section. The most common colours are between the dark blue and its brighter shades, and colorless variations.

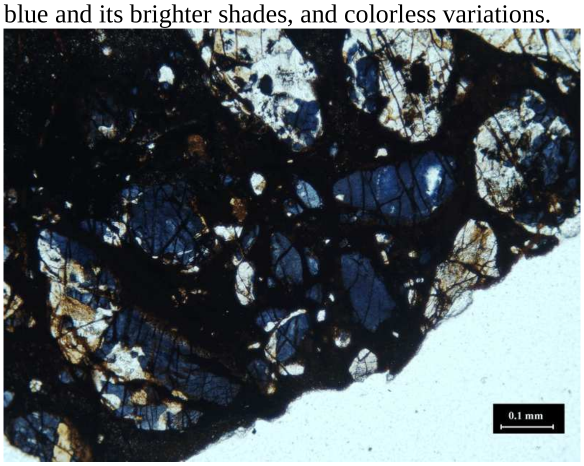

Fig. 1. Dark blue ringwoodite in black melt vein in NWA 5011.

But we observed some ringwoodite with other colour-types. We have discerned grayish-blue, and purple aggregates, too. Some ringwoodite aggregates show bicoloration, purple colour in the center, and dark or brighter blue colours at their circumference were present. In this latter case a slight Mn-enrichment was observed between the two parts of aggregates by using EMPA. In generally, we could demonstrate weak Fe-enrichment in the formed ringwoodite aggregates as compared with olivine in the chondritic part. The dark blue colour is always present in the finest grained aggregates, but colorless individual grains could reach 10 μm in size. In the case of colorless individual grains their boundaries have blue colour as it was also observed by [4]. The origin of this colouration was published by different authors [5]. We assume that because these various colours are not related to the major element composition of ringwoodite therefore it might have coherence with trace elements in the crystal structure, or cation disordering feature. The first phenomena can demonstrate that we observed such ringwoodite aggregates which have inner inclusions. Along the inclusions and their halo (which inclusions observed as negligee) evidently changes the colour to colorless whereas the most part of the aggregate have dark blue colour (Fig. 2). Of course, within some aggregate we can find often colorless parts without the presence of inclusions. We assume that primary individual grains have blue colours, and during the crystallization or in the subsequent processes their colour could have been changed.

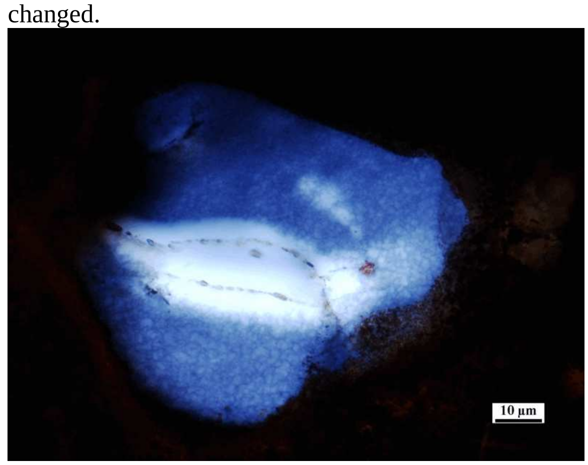

Fig. 2. Polycrystalline ringwoodite aggregate contains negligee-like inclusions. The colorless property is unambiguously related to towards of inclusions, which might be indicating trace elements migration.

We have found that the olivines in the chondritic part originally contained inclusions as well as the pyroxenes. In chemical aspect these parts of the aggregate could behave differently during the transition as compared to those parts where inclusions were absent. We assume that the inclusions are mainly fluids. Moreover, we assume those colorless parts of an aggregate where inclusions were not present, become swallowed after the phase transition processes. But it has a possibility that the colour variation may be related to different physical conditions at the blue and colorless areas [5]. Unfortunately, this idea is uncertain because of the unambiguous presence of the diaplectic olivine glass.

We propose on the base of our observation that in dark blue aggregates which contain submicron sized individual ringwoodite grains the dark blue colour is related to the numerous individual grain boundaries. The distinction in colouration is possible between the individual colorless grains and their boundaries.

Conclusion: The origin of the colours of ringwoodite aggregates especially in the cases of the blue and colorless varieties might be related to that inclusions which were originally in the untransformed olivine grains or were produced during or after the nucleation and growth of crystallites. Hence some colorless parts might be related to the trace element diffusion between the fluids/solids and the forming ringwoodite crystallites. Moreover, we propose that the individual grains and the grain boundaries should be distinguished on the basis of the colours, because they have different inner fine structure.

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