SHOCK-INDUCED MICRODEFORMATIONS OF GARNET FROM THE RIES IMPACT STRUCTURE. Sz. Nagy[1] (ringwoodit@yahoo.com), A. Gucsik[2], I. Kubovics[1], S. Józsa[1], Sz. Berczi[1], G. S. Gálné[1] [1]Eötvös Lóránd University of Budapest, H-1117 Budapest, Pázmány Péter sétány 1/c., Hungary; [2]University of West Hungary, Bajcsy-Zs. u. 4., Sopron, H-9400, Hungary,

Introduction: The Nördlinger Ries is a complex impact crater, which is located in the Southern Germany (N 48°53', E 10°37') with a rim-to-rim diameter of about 26 km [1,2]. Its excellently preserved ejecta blanket and breccia lens offer one of the most remarkable conditions for studies of impact cratering record and its geological consequences on Earth [1]. The preimpact stratigraphy of the target rocks contains a crystalline basement of pre-variscian gneisses and amphibolites and variscian granite.

These crystalline rocks were covered by sedimentary rocks of Upper Jurassic (limestone), Middle Jurassic (sandstone, marlstone, limestone), Lower Jurassic (sandstone, marlstone, limestone), Upper and Keuper (sandstone, siltstone, marlstone, claystone) and Lower Triassic sandstone. The southern part of the present basin was covered by ~25 m of unconsolidated Upper Miocene sands, marls and clays [1]. The *so called* Bunte Breccia is an approximately 600 m thick ejecta deposit (representing an asymmetric present distribution) composing unshocked and moderately shocked rock and mineral fragments of sedimentary and crystalline megablocks and monomict breccias (derived from the crystalline basement) [2]. The presence of shatter cones indicates that these rocks were affected by low shock pressures belonging to the low peak shock level (<10 GPa) [1]. The high peak shock level effects (>10 GPa) on quartz and other rock forming minerals (e.g., plagioclase feldspar) such as planar deformation features (PDFs) were described from shocked granite inclusion in suevite [3]. The other shock metamorphic indicators such as high-pressure mineral phases (e.g., coesite, stishovite) [4], diaplectic glass (e.g., feldspar transformed to maskelynite) [5] and fused quartz glass (lechatelierite) [6] from suevite were also found in the Ries Crater. The Ries Crater has been known as a source crater of moldavite tektites (Central European Strewn Field). According to Engelhardt [1], the stages of shock metamorphism in the impact formations of the Ries impact crater were characterized by plastic deformation and isotropization of minerals, the formation of high-pressure phases and the occurrence of melting phenomena. This classification was based not only on the Ries rocks but also on shock experiments. The pressures and estimated temperatures refer to rocks of approximately granitic mode and composition.The purpose of this study is to provide new information on the shock-induced microdeformations and shock stages of garnet as possible indicator mineral of shock metamorphism at, especially, impact structures that have crystalline target rocks.

Samples and Experimental Procedure: Several thin sections were produced from the suevite querry of Aumühle, Ries impact structure. These samples were investigted by an optical microscope distinguishing mainly quartz, biotite, K-feldspar (albite-anorthite), and Fe-rich garnet. These microscopical observations indicate that the host rock is a garnet-biotite gneiss.

Results and Discussion: According to Sazonova et al.[7], on the basis of experimentally shock-deformed garnet samples from a shock recovery experiment, it was found that the partial melting of garnet starts at 36 GPa, and is completed at 52 GPa. Moreover, they found planar, shock-induced microdeformations of the garnet samples shocked at 25 and 36 GPa, which are good agreement with our sample, too (Fig. 1.). These planar features are associated with partial melting features of biotite. Planar Deformation Features have been also identified in this sample.

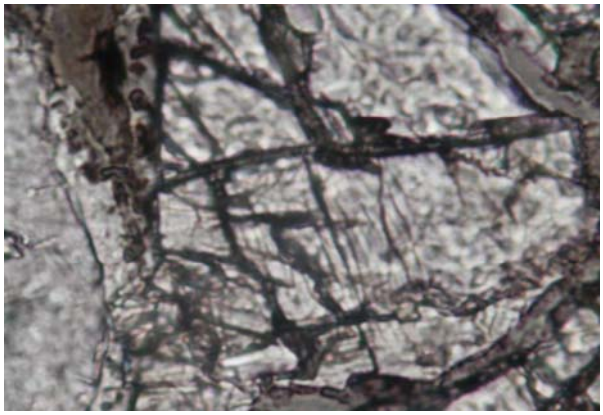

Fig. 1. *Shocked garnet from the Aumühle suevite querry showing shock-induced microdeformations (the width of the image is 250 μm).*

Consequently, according to the above-mentioned optical microscope observations of the shock-induced microdeformations of the shocked garnet grains and previous experimental data, the sample from the Aumühle quarry was shocked between 25 and 36 GPa. The further work will be done using microscopical, spectroscopical and luminescence techniques suchs as SEM-

CL imaging and micro-Raman spectroscopy to understand more about the shock-induced deformation pattern in garnet.

Acknowledgements: The authors are very grateful to G. Pösges for providing samples and comments on the Ries impact structure. This was partly supported by the Working Group on the Planetary Science at the Hungarian Academy of Sciences, Sopron, Hungary.

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