ORIGIN OF SCHLIREN BANDS IN CHINGA ATAXITE.

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Introduction: It is well known the presence of macroscopic selective reflection bands (Schliren bands or oriented sheen) in various ataxites IVB [1, 2]. However, the origin of Schliren bands is not clear yet. There were several different suggestions such as variety of chemical and phase compositions, shock alteration, and twinning to explain Schliren bands formation, but these explanations were not evident. In the present work we suggest an origin of the Schliren bands basing on Chinga ataxite IVB multiscale study.

Experimental: Chinga ataxite IVB fragments were studied using textural X-ray diffraction (XRD), optical microscopy with image analysis (OM), scanning electron microscopy (SEM) with EDX and EBSD, atom probe microscopy (APM) and transmission electron microscopy (TEM).

Results and Discussion: It was shown that Schliren bands in Chinga ataxite IVB were parallel dark and light lines with a width in the range of 1–10 mm and the same chemical composition. XRD and TEM demonstrated the presence of α and γ phase mixture with 20±5 vol.% of γ phase for both dark and light bands. Texture of α phase was complicated in both bands and presented by six crystallographic orientations. However, the set of orientations was different for dark and light bands. The presence of retained γ phase after martensite transformation (γ_R) as well as exsolved γ phase from martensite (γ_E) was shown earlier [3, 4]. We observed that orientation of γ_R phase was the same in dark and light bonds. This fact excludes twinning origin of the bands. It was further shown that planes (111) for γ_R and (011) for α were parallel. The directions $[1\bar{1}0]$ for γ_R and [100] for α in both dark and light bands were also parallel that was close to Nashiyama-Vasserman martensite orientation relationship. These results demonstrated that taenite decomposition in Chinga ataxite was by martensite type reaction: $\gamma_R \rightarrow \alpha_2 + \gamma_R \rightarrow \alpha' + \gamma_E + \gamma_R$. Thus, we can conclude that Schliren bands appeared due to formation of different crystallographic set of submicroscopic products during martensite transformation.

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