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ANALYSIS OF THRESHOLD-ASSOCIATED SCREW DISLOCATION DISPLACEMENT IN POLYGONIZED ALUMINUM

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Abstract- Dislocations play a fundamental role in the development of plastic deformation and on the behavior and shape of the **σ – ε**.curve. We establish a strong correlation between the dislocational structure in a polygonized aluminum of 99,3% purity by means of Transmission Electron Microscopy, TEM, under static conditions and the yield strength, deformation resistance and the rupture limit of the metal. The mechanical and thermal stability as a result of the sub-structural hardening, determine in great measure the consistency of the polygonized structure under load conditions. The process is analyzed when screw dislocations emerge to the sub-grains generating thresholds at the boundary vertices. We present here a theoretical development on the sliding of a screw dislocation thermally controlled with the simultaneous displacement of thresholds of different types.

The inter-relationship of sliding dislocations with sub-grain boundaries and their detailed description holds a very significant space for the development of this work. The mechanical and termal stability due to sub-structural hardening determine greatly the consistency of the polygonized structures, Figure 1, under pre-established exploitation conditions.[1]. The central problem in this work is the study of how the dislocational structures evolve in polygonized aluminum and to the analysis of the plastic deformation mechanisms under creep conditions. The same La misma topics established earlier- structure evolution- defines the metal type selected for this study. A narrow and strong correlation was established between the physical deformations of micro-specimens tested ***"in situ"*** inside the HVTEM. To achieve this the micro-specimens were sliced from macro-specimens under creep conditions..

Figure 1. Sub-grain structure of polygonized aluminum.

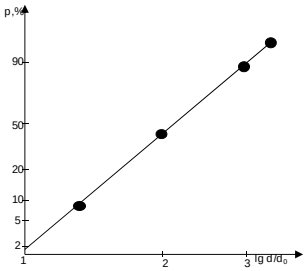

Figure 2. Sub-grain distribution as a function of their size in a poligonyzed aluminum wth 99,3% purity.

Keywords: *HVTEM, polygonization, creep, dislocations, structure, thermal activation.*

[1].Yermishkin, V., Kutilin, V.G., Myshliayev, M.M., Novikov, I.I. Analiz dvizcheniya i jaraktera dislokatsii s porogami po dannym eksperimentov v kolonne BTEM, //Fizika Metallov i Metallovedeniye, **199**, N3, Pgs.141- 152.