

2nd semester PhD Project Report

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ELTE TTK, Fizika Doktori Iskola, Anyagtudomány és Szilárdtestfizika PhD Program

Témavezető: Prof. Dr. Sidor Jurij, ELTE IK Savaria Műszaki Intézet

PhD Topic: Investigation of recrystallization phenomena in face-centered-cubic polycrystalline systems

Description: Recrystallization occurs in polycrystalline materials during thermo-mechanical processing (TMP). This phenomenon involves recovery, nucleation, grain growth and in some instances abnormal grain growth. The kinetics of each mention event is a function temperature, degree of deformation and time. In polycrystalline aggregates with face-centered cubic (FCC) structure, only several types of crystallographic orientations (also called texture components) tend to appear during the softening process. Additionally, this typical texture is disturbed in the case of particle containing alloys, where particle stimulated nucleation occurs after a certain straining level. However, the crystallographic textures evolved usually account for a strong anisotropy of mechanical properties, which is a main disadvantage of using light metals like Al alloys in the light-weight applications due to the poor performance during forming or drawing. Therefore, investigation of crystallographic texture evolution is of particular importance, since texture is a major source of anisotropy in metals. The proposed project aims to make the fundamental breakthroughs needed to enable the development of efficient materials with suitable mechanical properties via optimization of both microstructural characteristics and texture. The goal of this research can be reached via detailed investigation of texture evolution during recrystallization by various analytical techniques such as orientation imaging microscopy, indentation techniques and investigation of mechanical properties, which will enable the modeling of plastic anisotropy in the investigated alloys.

Subjects Registered

Courses	Remark / Grade
Physical Material Science- I	Excellent/ 5
Lattice defects II	Yet to appear

Other Academic Activities:

Took part in Coimbra Group 3 min thesis Competition	Selected for finals from ELTE	Finals are yet to be held
Took part in teaching activity at Faculty of informatics, ELTE; under the guidance of my supervisor	Sub- Structure of Materials III, B.Sc Mechanical Engineering	Successfully completed teaching duty for this semester

Research activities:

- On the basis of literature review on recrystallization phenomena in materials with FCC crystal structure a review paper is under process.
- Lab work has been proceeded with Aluminium 1050 and Aluminum 6082 alloys. Alloy 1050 is almost pure form of Al with minimum alloying and has been chosen to analyze relative properties. The samples have been cut and cold rolled both symmetrically and asymmetrically with certain rolling reduction. After that both type of sample is annealed at 530°C for different time variation so that we can understand the range of temperature- time correspondence for primary and secondary recrystallization within the material. Further lab work is under process.