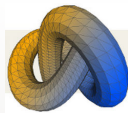
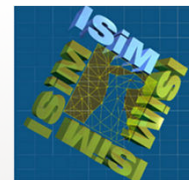
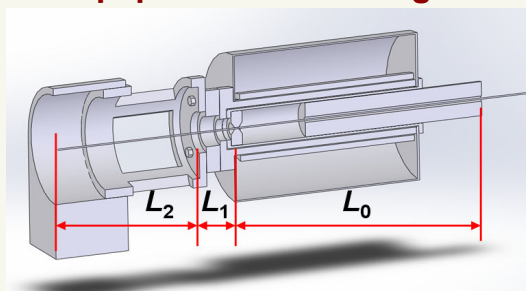
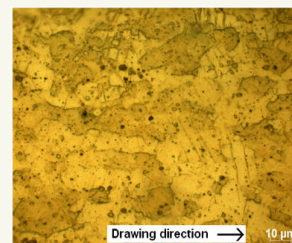
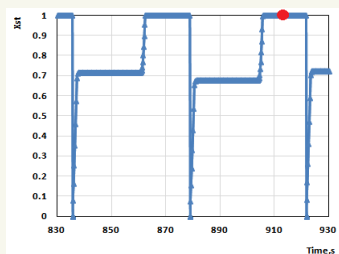
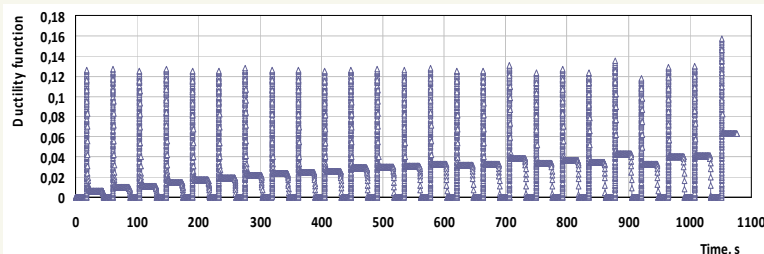


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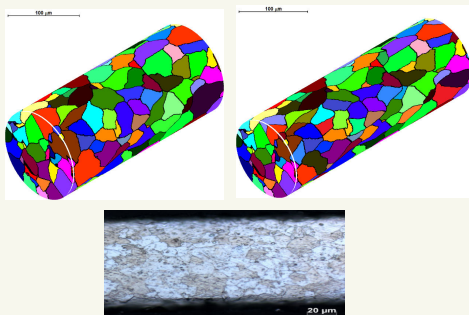
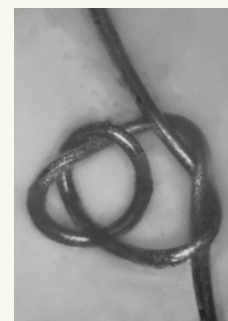
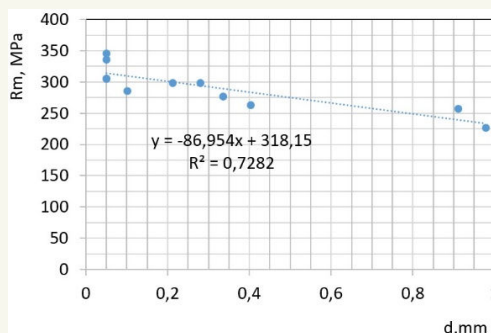
Head: prof. A. Milenin, milenin@agh.edu.pl

Department of Applied
Computer Science and
Modelling**Project 2012/05/B/ST8/01797****Development of multi- scale model of recrystallization, that occurs in fine wires from biocompatible Mg alloys during drawing at elevated temperature for diameters of wires, comparable with the size of grains of microstructure****Objective:** Development of mathematical model of recrystallization for MgCa08 alloy and implementation of this model into the FE code that simulates the process of wire drawing.**Equipment for drawing**Set of tools for drawing process in the heated die: L_0 – pre-heating zone, L_1 – high temperature zone, L_2 – cooling zone.**JMAK model**

$$X_{SRX} = 1 - \exp \left[c_4 \left(\frac{\tau}{\tau_{0.5}} \right)^n \right] \quad \tau_{0.5} = c_1 \varepsilon^2 D_0 \exp \left(\frac{c_3}{RT} \right)$$

**Model of ductility**

$$\psi^{(m+1)} = \psi^{(m)} + \frac{\bar{\xi}^{(m)} \Delta \tau^{(m)}}{\varepsilon_f(k_f, t^{(m)}, \bar{\xi}^{(m)})} - \psi^{(m)} \Delta X_{SRX}^{(m)}$$

Results of simulations for drawing velocity 10 mm/s and temperature 350°C: ductility parameter.**Cellular automata model****Wire d=50 μm****Participants:**Prof. A. Milenin,
Dr. inz. P.Kustra,
Prof. D.Svietlicznyy,
Prof. M.Pietrzyk,
Dr. inz. I.Kalemba**Publications:**

1. A. MILENIN, P. KUSTRA, D. BYRSKA-WÓJCIK FEM-BEM code for the multiscale modeling and computer aided design of wire drawing technology for magnesium alloys // Advanced Engineering Materials; 2014 vol. 16 iss. 2, p. 202–210
2. D.S. SVYETLICHNYI, P. KUSTRA, A. MILENIN Modeling with FCA-based model of microstructure evolution of MgCa08 alloy during drawing of thin wire in heated die // Archives of Metallurgy and Materials / – 2015 vol. 60 iss. 4, p. 2721–2727.