

Announcement of a Master's Thesis, 01.01.2021

Simulation of precipitation strengthening in Al-Cu alloy

Description

Precipitation hardening is one of the strengthening techniques used for improving yield strength of the engineering materials. In this mechanism, precipitates nucleate and grow in microstructure and hinder dislocation movement which increase yield strength. Precipitates are crystallography coherent to the metal matrix at the early stages of nucleation while they lose their coherency during evolution. precipitation sequences in Al-Cu alloy can be described as,

SSSS \rightarrow GP Zones \rightarrow Θ'' (coherent) \rightarrow Θ' (semi-coherent) \rightarrow Θ (incoherent).

In the current study, the focus lied on modelling and simulation of the main strengthening Θ'' and Θ' precipitates which have specific crystal structures.

The thermodynamic software MatCalc will be used for simulation of precipitation strengthening of Θ'' and Θ' oblate precipitates, which are extend in fcc matrix in the $\{100\}$ planes. Afterwards, the simulation result of this study will be compared to the existing experimental results obtained from Transmission Electron Microscopy (TEM). Figure 1 schematically describes simulation result of the total yield strength after artificial aging.

The outcome of this study will be a scientific journal paper.

Organisation

Supervisor: Dr.techn. Mohammad Reza Ahmadi, <mailto:mohammad.ahmadi@tugraz.at>, Tel: +43 316 873 1678

Univ.-Prof. Dipl.-Ing. Dr.techn. Christof Sommitsch, E-mail: christof.sommitsch@tugraz.at

Duration: from 01.01.2021 for 6 months

Location: IMAT institute, Materials group, Kopernikusgasse 24/I, 8010 Graz

Further informationen

For further information please contact the secretariat of the institute or the supervisor.

Tel: +43 316 873 7181, office.imat@tugraz.at, <http://imat.tugraz.at>

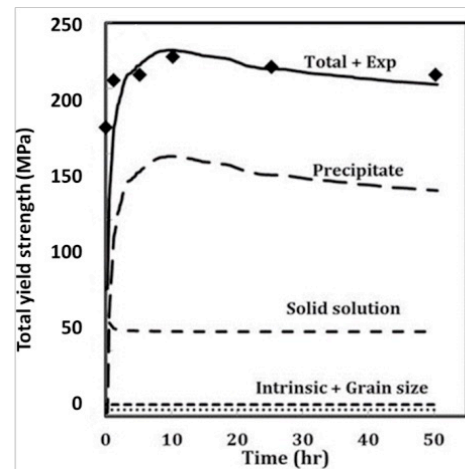


Figure 1: Total yield strength of Al-Cu, schematically.