Data Assessments for the ALLEE project

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One of the main aims of the ALLEE project is the design of materials with improved mechanical and electrical properties like superior tensile strength and enhanced electrical conductivity for use in power transmission lines. For this purpose, Al-alloys are good candidates. A new strategy using nanostructural design to produce Al-Mg-Si alloys with high strength and enhanced electrical conductivity has been reported[1]. In this context the element Fe, frequently appearing as an impurity, has great effect on the before mentioned materials properties. Its influence on mechanical strength and electrical conductivity has been examined recently[2].

Within the scope of the ALLEE project a thermodynamic database for Al-alloys containing Cu, Fe, Mg, Mn, Ni, Pb, Si and Zr as alloying elements is being established to allow the support of materials design by thermodynamic calculations. The data contained in this database is permanently subject to critical survey, recently the $c_p(T)$ functions of stoichiometric compounds. Oftentimes they are based on a relatively simple Neumann-Kopp approach leading to artefacts in the $c_p(T)$ curves.

The presentation will suggest how to improve the Neumann-Kopp approach, if no further data are available. For stoichiometric compounds in the binary systems Al-Zr and Al-Ni, the method will be compared to experimental $c_p(T)$ data provided by one of the project partners. Further, based on thermodynamic calculations, the results published by Q. Zhao et al.[1] (see before) will be evaluated briefly.

[1] R.Z. Valiev, M. Yu. Murashkin, I. Sabirov, Scripta Materialia 76 (2014) 13

[2] Q. Zhao, Z. Qjan, X. Cui, Y. Wu, X. Liu, JALCOM 666 (2016) 50