

The GTT-Aluminum database

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Based upon a database developed within a former project named “ClaNG” (Classic Nucleation and Growth), during the last two years this database has been extended and further developed within the scope of the project “ALLEE” focusing on Aluminium alloys. Starting from the original “ClaNG” database containing the seven elements Al, Cu, Fe, Mg, Mn, Pb, Si, in a first step metastable phases in the ternary Al-Mg-Si system such as Guinier-Preston zones (GP-zones, “Matsuda phase”), Mg-Si β' and β phases published by Povoden-Karadeniz et al. [Pov 13] were included. The metastable equilibria calculated by [Pov 13] now can be nicely reproduced. In a second step the element Ni was added. In consequence, all binary systems containing Ni and one of the other seven elements above have been added. For the ternary systems Al-Fe-Ni [Zha 09] and Al-Fe-Si [Du 08], assessments from literature which are quite up to date, have been incorporated in the database after critical revision.

Due to lack of data for most of the temperature dependent heat capacities of stoichiometric compounds, the c_p functions of the latter usually are described by a polynomial created with the Neumann-Kopp approach. These functions often exhibit unwanted artefacts which stem from the melting behavior of the pure elements. Within the scope of the ALLEE project, heat capacities of several binary and ternary stoichiometric compounds have been measured as functions of temperature with DSC by our project partner LWT Rostock. The systems Al-Fe, Al-Ni and Al-Zr have been reoptimized using either experimentally based or “refined” $c_p(T)$ functions. In the next step reoptimization of solution phases with either experimentally based or “refined” $c_p(T)$ -functions for the phase constituents is actually in progress.

[Du 08] Y. Du, J.C. Schuster, Z.-K. Liu, R. Hu, P. Nash, W. Sun, W. Zhang, J. Wang, L. Zhang, C. Tang, Z. Zhu, S. Liu, Y. Ouyang, W. Zhang, N. Krendelsberger, *Intermetallics* 16 (2008) 554

[Pov 13] E. Povoden-Karadeniz, P. Lang, P. Warczok, A. Falahati, W. Jun, E. Kozeschnik, *Calphad* 43 (2013) 94

[Zha 09] L. Zhang, J. Wang, Y. Du, R. Hu, P. Nash, X.-G. Lu, C. Jiang, *Acta Mater.* 57 (2009) 5324