## Surface Tension and Viscosity of Ti-6Al-4V, Ti-48Al-2Nb-2Cr, Ti46Al-8Nb and Ti46-Al46-Ta8 from Measurements with the Oscillating Drop Method in an Electromagnetic Processing Device on Board the International Space Station and on Board Parabolic Flights

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*Ti-6AI-4V* (wt%) and its variants are an established material from medical implants to high temperature jet engine applications. However, due to the high melting temperatures in this alloy class of  $\geq$  1600 °C and high chemical reactivity of liquid *Ti*-alloys few reliable data exist about their thermophysical properties in the liquid phase. For example, the surface tension as a function of temperature is a critical parameter in the design and modelling of fine structured castings for dentistry. Similar arguments apply to the  $\gamma$ -*TiAI* class of alloys based on the *Ti50-AI50* (at%) composition with applications mainly in the aerospace industries.

In the course of a measurement series of thermophysical properties of industrial *Ti*-alloys with the Materials Science Laboratory – Electromagnetic Levitator (MSL-EML) on board the International Space Station, ISS, and in a series of parabolic flight experiments the surface tension and the viscosity of the alloy *Ti-6Al-4V* and of a series of  $\gamma$ -*TiAl* alloys was measured. Surface tension and viscosity data will be presented. A comparison between results obtained with the eml device on board parabolic flight airplanes and on the ISS will be given. The viscosity results will be analyzed in terms of semiempirical thermodynamic models. It turned out that these models can hardly reproduce the experimental results within a confidence level ± 50%. This raises the question of how to valuate or judge viscosity values of high temperature metallic alloys which cannot be verified by standard experimental techniques and where apparently is little guidance from theory or first principles modelling.