

Thermal Diffusivity of TiAlTa alloy - the European IMPRESS Project

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The thermal diffusivities of some industrially important alloys have been measured as a part of the EU funded IMPRESS project which is coordinated by the European Space Agency (ESA). The thermal diffusivities of the alloys were measured by the Laser flash method with a carefully designed gas cleaning system to remove traces of oxygen from the argon atmosphere. In the present work, the thermal diffusivities of TiAlTa alloy (Ti_{46.1}Al_{45.9}Ta₈ at %) at different temperatures have been measured. One anomaly observed in the present work on TiAlTa was a maximum thermal diffusivity value at about 1200 K. In view of the similarity of the phase relationships, the present results are interpreted on the basis of the experimental results obtained in the case of Ti_{46.1}Al_{45.9}Nb₈ at % system. Generally the variation of thermal diffusivity appears to be related to the phase transformation. In the case of the TiAlNb system, however, no corresponding peak was found for the density, ρ , the specific heat capacity, C_p , or the electrical resistivity, σ , which were also measured as part of the project. In view of the fact that the thermal diffusivity could be related to electrical conductivity by the Wiedemann-Franz law describing electronic contribution to heat conduction, the present results indicate a non-electron contribution. This aspect is being currently investigated further.