

# Collaboration between Osaka University and GTT Some examples of Calculation for Material Processing at High Temp. by the FactSage Family

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## ABSTRACT

We have had collaboration with GTT for 20 years, and applied FactSage Family for various evaluations of material properties at equilibrium and non-equilibrium such as

- 1) Surface tension of liquid alloys, molten slag and so on
  - 2) Phase diagrams of nano-particle alloys
  - 3) Iron-making on the Moon by reduction of lunar soil
  - 4) Chemical reactions of liquid Na alloys with stainless steels
  - 5) Viscosity and surface tension of molten slag
  - 6) Sulphide capacity of molten slag
  - 7) Wettability of liquid metals and solid oxides
- etc.*

The above evaluations for 1)-4) were done by FactSage, and the other 5)-7) by SlagVis, which was developed by us and RCCM in Tokyo, Agency of GTT Technologies in Japan.

In this seminar, I will explain some topics on 4)-7).

Dr. Klaus Hack developed a new thermodynamic database for liquid Na alloys. We have used it to evaluate chemical reactions of liquid Na alloys with Fe-Cr-Ni alloys, which are used for cooling systems in a nuclear power plant. We need to evaluate the stability of those alloy systems under various conditions with temperature and partial pressure of oxygen.

SlagVis is a new software based on neural network computation. This is one of the powerful regression method to evaluate correlations among a lot of complicated information. We have applied SlagVis to obtain the composition dependence of viscosity and surface tension of molten slag in multi-component systems.

In our recent trial, we have found a correlation of the wettability of liquid metals with solid oxides by using some physical properties which seems to control the wettability of those materials. We hope we could evaluate various complicated thermodynamic reactions under transport conditions accompanying the wetting and adhesion phenomena of concerned species by applying the combination of all of the above trials.