

MORITA-YOSHIKAWA LAB.

[Materials Processing for Sustainable Society]

International Research Center for Sustainable Materials

<http://wood2.iis.u-tokyo.ac.jp>

Materials Production and Recycling Engineering Lab.

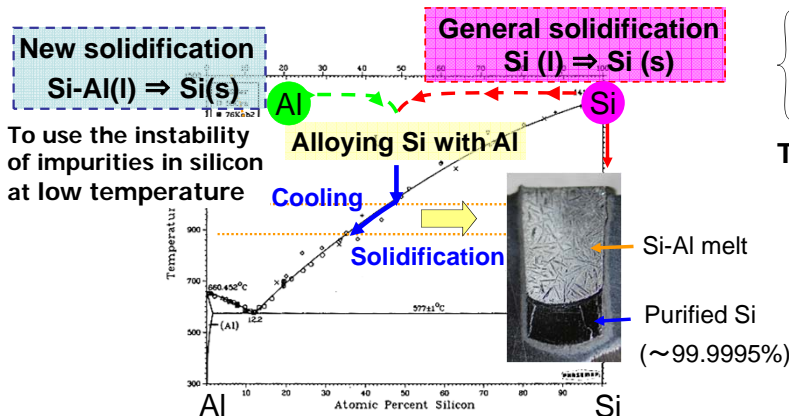
Dept. Materials Engineering

We consider elementary materials, such as steel and silicon, as recycling materials, and aim at the establishment of environment-friendly society by developing their production and recycling processes together with by-product treatment. Physico-chemical studies for *Innovation of Iron- and Steel-making*, *Solar-Grade-Silicon Refining Processes* and *Enrichment of Waste Materials* are being carried out in our laboratory with consideration on thermodynamics and high temperature physical properties.

Development of Novel Refining Process for Solar Grade Si

◆ New concept refining by solidification

- Low temperature purification using alloy solvent



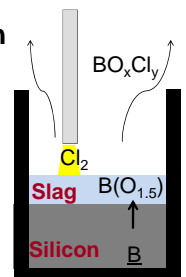
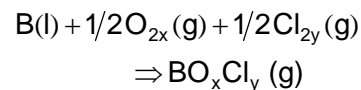
◆ Purification by slag with gaseous chlorine

- Vaporization of B through molten slag

- Limit of B removal by single slag phase
- Affinity of B with chlorine

To suppress silicon chlorination

⇒ Cl₂ supply through molten slag



High Temperature Physical Chemistry of Iron- and Steel-making Processes

◆ Slag chemistry – physico-chemical properties and structural analysis

Target

- Optimization of refining process
- Heat recovery from molten slag

To construct the sustainable refining processes

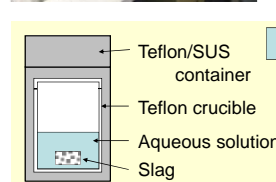
◆ Value-addition and immobilization of slag – Hydrothermal-microwave treatment

Research contents

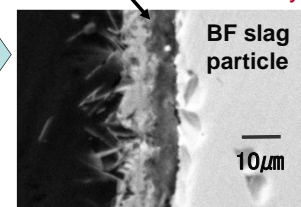
- Thermodynamics study of molten slag
- Solid-state NMR spectroscopy for analyzing slag structure
- Thermal conductivity of slag (Determination by hot wire method.)



Gradual cooling of steelmaking slag



Tobermorite formation
Ca₅Si₆O₁₆(OH)₂·4H₂O
⇒ Immobilization of heavy metal



Cross section of BF slag after the hydrothermal process