

MORITA 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.

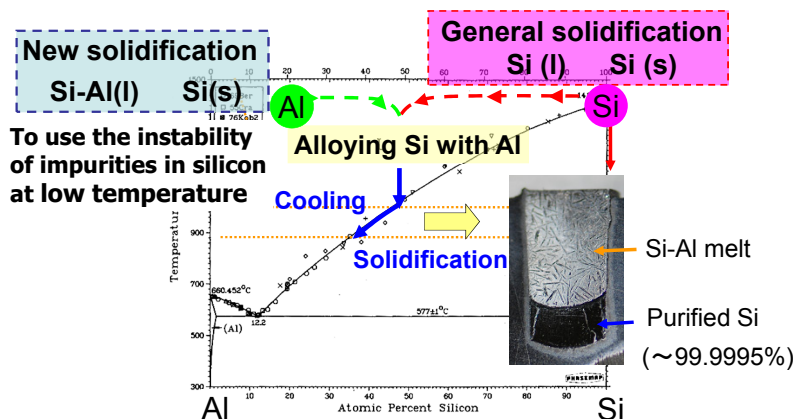
Dept. Materials Engineering

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

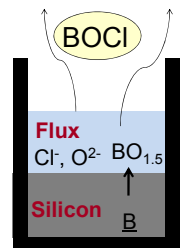
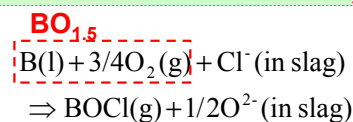
- Low temperature purification using alloy solvent



Refining with reactive fluxes - I -

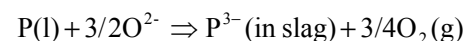
- Removal of B by oxychloridation

Continuous removal of B into gas phase even with low flux/silicon distribution ratios of B



Refining with reactive fluxes - II -

- Reductive removal of P with CaO based fluxes



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

Thermodynamics of minor elements in solid and molten steel

Slag chemistry – physico-chemical properties and structural analysis

Target

- Optimization of refining process
- Heat recovery from molten slag

To construct the sustainable refining processes

Research contents

- Thermodynamics study of molten slag
- Thermal conductivity of slag (Determination by hot wire method)



➤ Solid-state NMR spectroscopy

for analyzing slag structure

Atomic-molecular levels understanding and control of thermodynamic and physico-chemical properties of slag



¹¹B MAS-NMR spectrum in CaO-SiO₂ slag

Boron changes its structure from trigonal to tetrahedral coordination with oxygen

