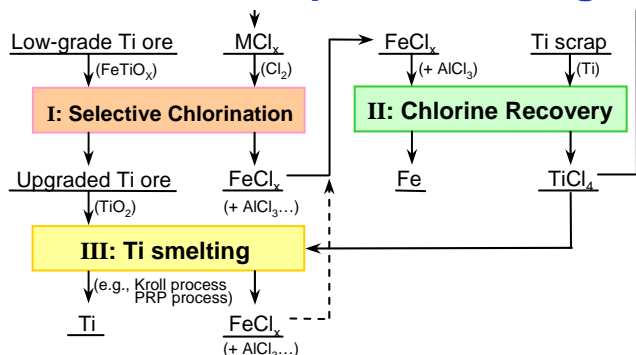


# New Titanium Production Process

## Iron Removal from Titanium Ore by Selective Chlorination and Effective Utilization of Chloride Wastes and Titanium Scrap Development of New Environmentally Sound Process

### New process using low-cost low-grade Ti ore



The research objective is to develop a new environmentally sound process using low-cost low-grade Ti ore.

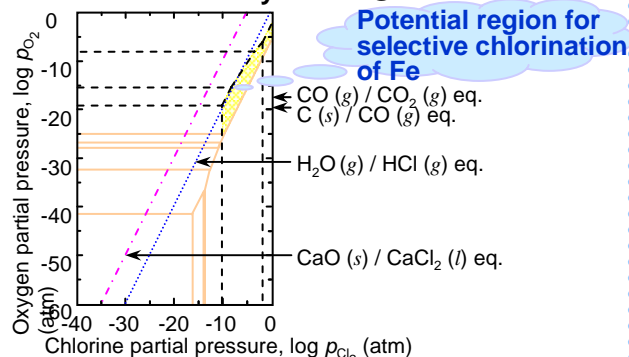


Ti feed with low Fe concentration obtained by selective chlorination can be reduced to metallic Ti in Kroll process or other new Ti smelting processes.

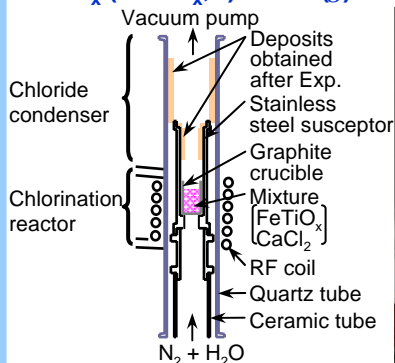
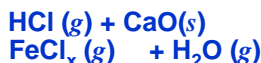
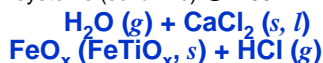
## Thermodynamic analysis and experimental

### I: Selective Chlorination

#### Fe-Cl-O & Ti-Cl-O Systems @ 1100 K



Chemical potential diagram for Fe-Cl-O (dotted line) and Ti-Cl-O systems (solid line) @ 1100 K.



Fe was removed from Ti ore.

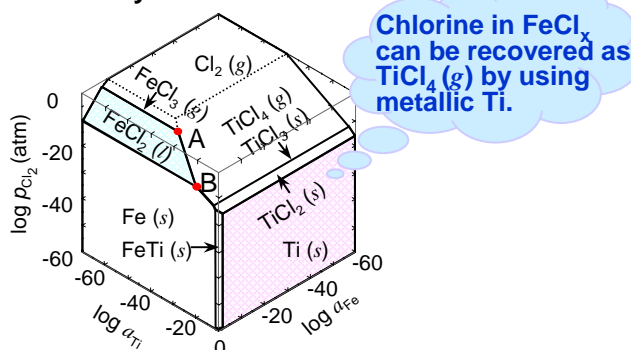
Utilization of low-grade Ti ore

Decrease in production cost of Ti

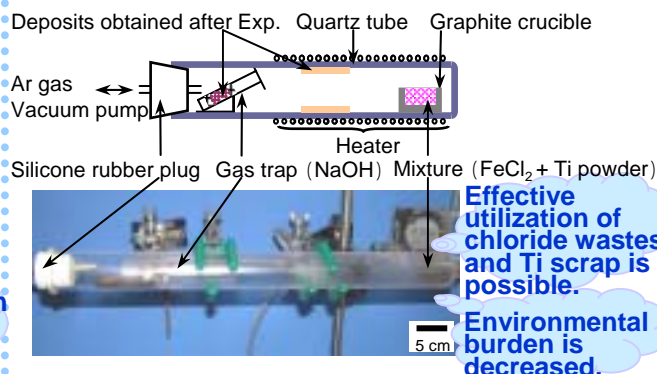
Fe was selectively removed from Ti ore.

### II: Chlorine Recovery

#### Fe-Ti-Cl System @ 1100 K



Chemical potential diagram for Fe-Ti-Cl system @ 1100 K.



Effective utilization of chloride wastes and Ti scrap is possible.  
Environmental burden is decreased.

Ti feed material was produced, at the same time, chlorine in  $\text{FeCl}_x$  was recovered.

Resource Recovery and Materials Process Engineering Laboratory