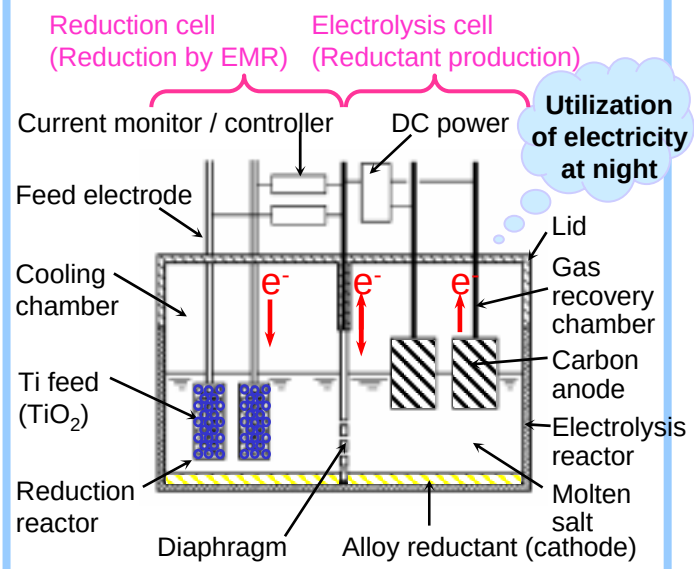
New Production Process of Rare Metal

Development of New Production Process for Conversion of "Rare Metal" into "Common Metal"

New Ti production process



Schematic illustration of EMR/MSE process

Reduction (EMR)

Cathode: $TiO_2 + 4\,e^- \rightarrow Ti + 2\,O^{2-}$ (1)

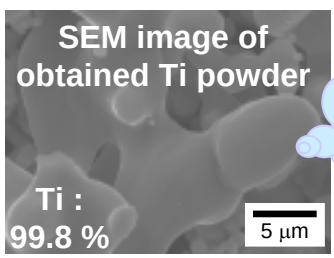
Anode: $Ca \rightarrow Ca^{2+} + 2\,e^-$ (2)

Production of reductant (MSE)

Cathode: $Ca^{2+} + 2\,e^- \rightarrow Ca$ (3)

Anode: $C + x\,O^{2-} \rightarrow CO_x + 2x\,e^-$ (4)

Overall $TiO_2 + C \rightarrow Ti + CO_2$ (5)

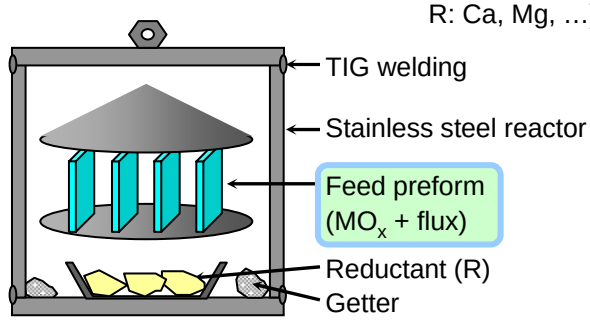


Scaling-up of this process is under investigation.

Next-generation low-cost production process of Ti is under development.

New industrial process for producing highly pure rare metal powder by Preform Reduction Process

$MO_x + x\,R \rightarrow M + x\,RO$ (M: Nb, Ta, Ti, … R: Ca, Mg, …)



Schematic illustration of reactor for PRP

Preform fabrication

Flux: CaO, $CaCl_2$

Binder: Collodion

After calcination

Temp.: 800~1000 °C

Holding time: 1 h

After reduction

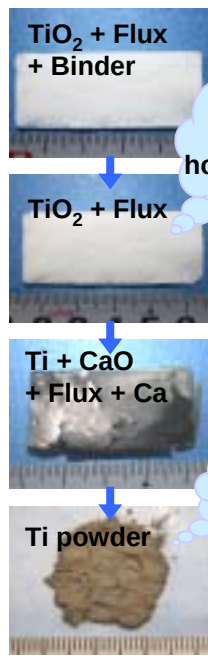
Temp.: 800~1000 °C

Holding time: 6 h

Ti powder obtained after leaching

Acetic acid: 6 h

Hydrochloric acid: 0.5 h



Suitable for homogeneous reduction

Simple method

New industrial process for producing rare metal powder with high purity and controlled morphology was developed.

Resource Recovery and Materials Process Engineering Laboratory

2005/11/15
Abiko, Oda (O.T.)
0511_001_Ti_EMR_PRP.ppt

Okabe Lab.

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Institute of Industrial Science, The University of Tokyo