OUCHI LAB.

Highly Efficient Energy Use and Resource Recycling

Research Center for Sustainable Material Energy Integration

Physical Chemistry for Energy and Materials
Department of Materials Engineering, Graduate School of Engineering
https://www.ouchi.iis.u-tokyo.ac.jp/

Energy into Metals!!

Ouchi Laboratory is engaged in the research and development of new smelting and recycling processes for nonferrous metals with an aim to achieve "Highly Efficient Use of Energy and Resource Recycling." We contribute to the development of advanced technologies by efficiently converting energy into metal forms. We also contribute to the realization of a sustainable society by developing innovative recycling processes that actualize resource recycling.

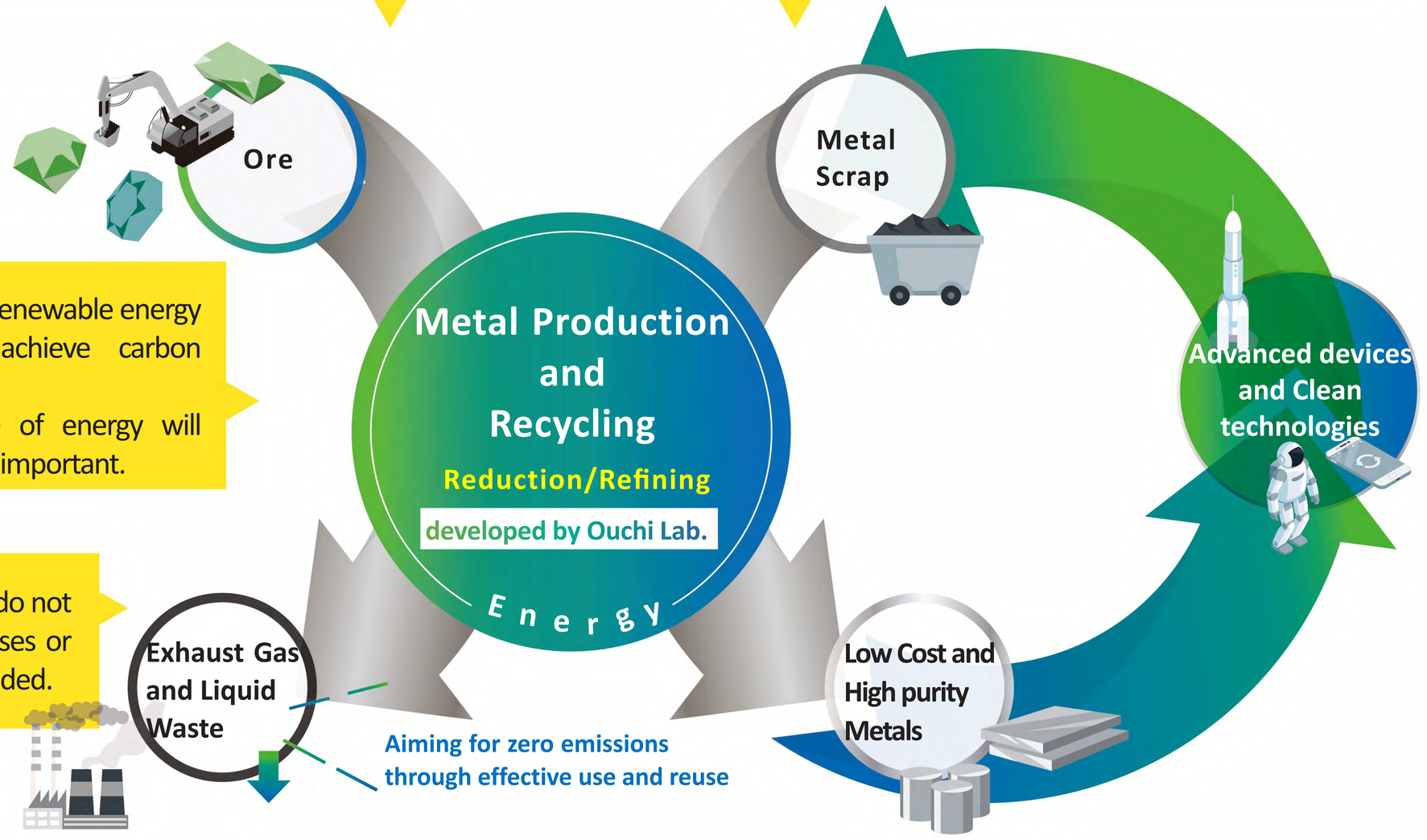
The 4 challenges of Ouchi Lab.

Point! 1
Development of processes with low-cost, efficient energy use, CO_2 reduction, and low environmental impact

Point! 2
The introduction of renewable energy is promoted to achieve carbon neutrality.
Highly efficient use of energy will become increasingly important.

Point! 3
New processes that do not generate exhaust gases or waste liquids are needed.

Point! 4
Energy conservation, CO_2 reduction, and low environmental impact must be achieved by promoting recycling.



KEY RESEARCH TOPICS

Precious metals(PMs) & Rare metals

The gold and platinum group metals are key materials for advanced devices.
We develop new processes to efficiently recover PMs from metal scraps using "Anodic deposition" though the anionic dissolution of PMs in molten salts and molten salt electrolysis. The process is also utilized for recovering and concentrating rare metals from base metals.

Reactive metals

Lithium, sodium, calcium, magnesium, aluminum, zinc, and rare earth metals are used in energy materials, functional materials, and structural materials and reducing agents for metal production.
We develop innovative smelting and refining processes by controlling electrochemical reactions in molten salts.

Titanium

Producing titanium metal from ore involves a specific multi-stage, energy-intensive, and high CO_2 emission process.
To replace such a time-consuming and high-cost process, we develop new processes to efficiently remove oxygen from titanium scrap and enable "upgrade recycling" by producing purer titanium compared to that produced from the ore.

Electrochemical plating

For advanced devices, electrochemical plating is indispensable for fabricating wires and contacts, corrosion protection materials, functional components, catalysts, etc.
We develop innovative plating technologies to produce structures and films with the desired functions and shapes by controlling the behavior of metal ions, electrode surface potential, and crystal structure.