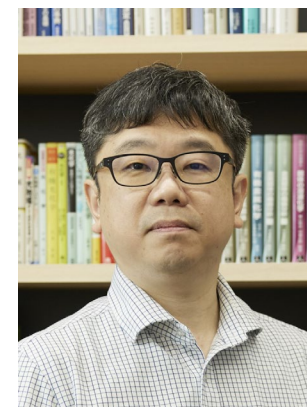


Resource Circulation

R&D Project Title : Development of green hydrogenation of low concentration CO₂

Project Leader : Kentaro Teramura
Professor, Department of Molecular Engineering, Kyoto University



R&D Team :

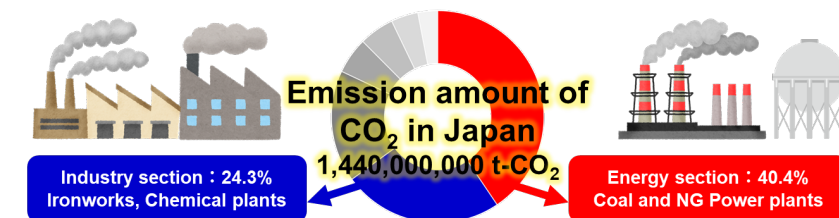
Summary :

The objective of this R&D project is to develop catalysts and chemical process technologies capable of converting low concentrations of CO₂ emitted from coal and natural gas power plants, iron and steel mills, and chemical plants, which are known to be major sources of CO₂ emissions, into fuel and chemical feedstocks.

This R&D proposal considers CO₂ as a resource to be utilized and develops low-concentration CO₂ hydrogenation that enables to use green hydrogen produced by renewable energy sources. We propose CO₂ hydrogenation using catalysts operated under low-concentration CO₂ conditions as a fundamental technology that can be applied to any emission source. To move away from the noble metal catalysts, which have been used in the past, we develop novel catalysts based on redox of lattice oxygen and oxygen vacancies in oxides to achieve the low-concentration CO₂ hydrogenation.

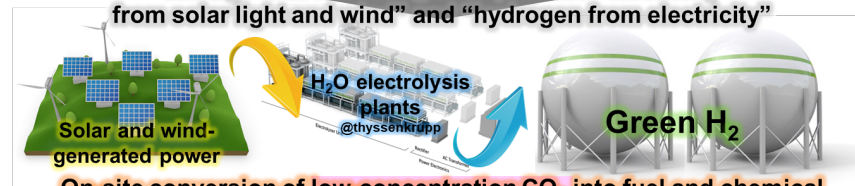
The concept of carbon neutrality from the viewpoint of carbon resources requires that the bare minimum amount of carbon resources necessary for our society be obtained from fossil resources and biomass, and then recycled in our society (artificial carbon cycle). If we can convert CO₂, which is currently emitted without any limitation, into fuel and chemical feedstocks necessary for our society by using green hydrogen as an energy source, we can achieve a large-scale carbon cycling system and contribute to carbon neutrality.

Green hydrogenation of CO₂ into fuel and chemical feedstocks



Relatively low concentration of CO₂ emitted | less than 10%

Linkage with technologies to produce “electricity from solar light and wind” and “hydrogen from electricity”



On-site conversion of low-concentration CO₂ into fuel and chemical feedstocks through underlying catalyst technology

