Elemental circulation, Environment, Resource, Energy, Catalysis

OGURA LAB.

Frontiers for Elements Circulation Society

Research Center for Sustainable Materials Energy Integration Department of Materials and Environmental Science

Catalyst/Catalysis Department of Chemical System Engineering, Graduate School of Engineering

www.ogulab.iis.u-tokyo.ac.jp

Planetary Boundary: Big Society, Small Earth



Fe206

For Reactive Nitrogen Circulation $NOx + H_2 \rightarrow NH_3 + H_2O$ NTA

Nitrogen Flow

Phosphorous Balance

For Carbon Neutrality \rightarrow CO₂ ad CO_2 $CO_2 + Org \rightarrow R-CO_2$ $CO_2 + H_2 \rightarrow CH_3OH \rightarrow C_{2\sim 4}$ MTO+BTX $CO_2 + H_2 \rightarrow CO + H_2 \rightarrow C_{5+}$ $CO_2 + H_2 \rightarrow CH_4$ Triglyceride + $CH_3OH \rightarrow \rightarrow \rightarrow$ Biodiesel Production

DACCUS Organic Syn. FTS Methanation

Ozone Hall

Climate Change



Ocean Acidification

Fresh Water

Aero Sol

Biosphere Conservation

Novel Substances

Catalyst as the Key Material

Land Use

For Environmental Protection NOX, N_2O $\rightarrow N_2 + O_2$ NOx, $N_2O + NH_3 \rightarrow N_2$ $+ H_2O$ $N_2O + CH_4 \rightarrow N_2 + CO_2 + H_2O$ Estrogen + $H_2O_2 \rightarrow \rightarrow \rightarrow$

Direct Decomposition Selective Reduction by Ammonia Selective Reduction by Hydrocarbons **Elimination of Environmental Hormones**

