

# Energy Resources & Security Science

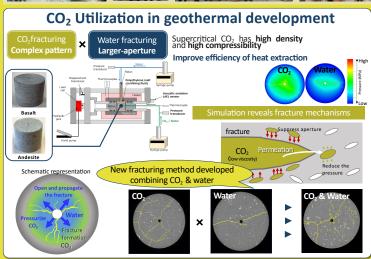
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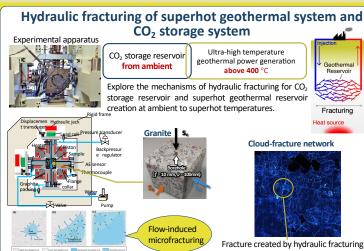


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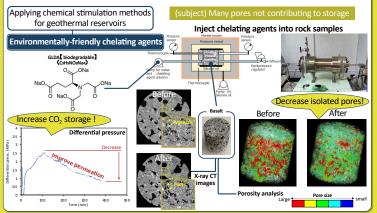
We conduct research on technologies for the development and production of sustainable and profitable energy resources. The research includes assessment and mitigation for environmental risks that may arise in the process of the development and utilization of the resources. Our research is based on the understanding of the properties of soil, rock, and fluids, as well as coupled phenomena of heat and fluid transfer, deformations, and chemical reactions, under various conditions resembling earth's surface and subsurface.







## Improving reactivity and permeability with chelating agents to facilitate CO<sub>2</sub> storage and mineralization



## Exposure Risk Assessment of volatile substances

Elucidation of spatio-temporal mass transfer process

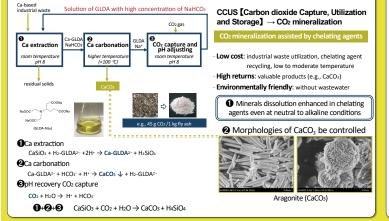
• Although the importance of exposure by inhalation has been recognized of soil-derived volatile chemicals, there was no quantitative assessment of volatilization flux

by developing a model take into account rainfall & temperature Measured Temp. O Measured volatilization flux

Regulation does not include

History matching of measured values from experiments with calculated values from numerical simulations

#### Chelating agent-looping process for enhanced CO<sub>2</sub> capture and storage



### Natural chelating agent enhances mineral dissolution for CO<sub>2</sub> reduction Development an efficient and environmentally friendly CO<sub>2</sub> reduction system on a global scale by enhanced

dissolution of minerals using natural chelating agents and to establish related fundamental theories. Mineral dissolution for CO<sub>2</sub> reduction Increased pH for CO<sub>2</sub> capture For mineral HCO<sub>3</sub> + H<sup>+</sup> Effect of pH condition Effect of types of chelating agent