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Development of a permanent exhibit visualizing the mechanism of carbon dioxide underground storage

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Underground storage of carbon dioxide is an important method to reduce atmospheric emissions of greenhouse gases, which may contribute to the global climate change. Recent scientific investigations argue that residual gas trapping is an effective mechanism to securely store CO₂ in aquifers, especially in Japan. In order to make progress on this approach, understanding and support from the public are vital, but the geological storage of CO₂ has not well-known to the community.

The Nagoya City Science Museum developed a permanent exhibit to visualize the mechanism of residual gas trapping in aquifer. The modeled aquifer, originally designed by Takahashi et al., (2006), is made of layers of glass beads in an acrylic cistern. We used two sizes of glass beads, 1mm and 2mm in diameter, as differently permeable layers of porous sediments. The experiment can be automatically operated as follows: 1) fill the pore space of the glass beads with water, 2) inject air from the bottom of the cistern and observe the behavior of the injected gas, 3) stop the air injection then discharge the water to initialize the experiment. Lighting from the front side makes effective visualization due to retroreflection of the glass beads. We believe this exhibit will give a better understanding of carbon dioxide underground storage to the visitors.

Keywords: carbon dioxide underground storage, residual gas, permanent exhibit, science museum