

Development of a computer-aided analysis tool for evaluation of CO<sub>2</sub> capture and conversion processes

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To evaluate CO<sub>2</sub> capture and conversion processes for reduction of CO<sub>2</sub> emission, it should be analyzed in various aspects. Firstly, CO<sub>2</sub> reduction feasibility should be verified by calculating carbon footprint (mass of CO<sub>2</sub> per mass of product) of overall processes. Second aspect is economics, which is about profitability from product sales. Lastly, being implemented to CO<sub>2</sub> sources, the amount of annual CO<sub>2</sub> reduction (mass of CO<sub>2</sub> per time) should be analyzed. As a result, complicated calculation and a large number of required data sets are the obstacles in the evaluation. To overcome these, in this work, a computer-aided analysis tool for evaluation of CO<sub>2</sub> capture and conversion processes is introduced. With a systematic guideline, intuitive interface, and massive database, it helps users to evaluate a given CO<sub>2</sub> capture and conversion process very conveniently. Especially, a concept of a superstructure network is applied, so users can analyze multiple processing pathways at the same time. As exemplary systems, several CO<sub>2</sub> conversion processing pathways for production of methanol, acetic acid, and synthetic fuel are introduced, and their evaluation results are discussed.