Practical CO_2 Fixation into Organic Molecules Using a Combined Brønsted Base

Principal Investigator: Masanori Shigeno
Institution: Aoba, Sendai 980-8578, Japan
Tel: 022-795-5917
E-mail: masanori.shigeno.e5@tohoku.ac.jp
Cooperated by: Graduate School of Pharmaceutical Science, Tohoku University

[Abstract]

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Utilization of CO_2 is an important topic in the modern scientific research area. This is because the atmospheric CO_2 concentration has continuously increased after the industrial revolution and has reached 408 ppm, exceeding the safety limit of 350 ppm. Besides, from the viewpoint of organic synthesis, CO_2 is an ideal C1 source owing to its low cost, low toxicity, high abundance, nonflammability, and high reproducibility. However, CO_2 is kinetically and thermodynamically stable, rendering its efficient utilization difficult.

In this project, we developed the CO_2 fixation into C-H bonds of aromatic compounds using combined Brønsted base system and thermal energy. The obtained products are aromatic carboxylic acid derivatives, which are an important structural motif of various functional materials such as biologically active compounds, pharmaceuticals, and agrochemicals. Our system covers a wide range of substrates including arenes, heteroarenes, and alkylarenes.[1)-4)] Furthermore, the system is compatible with a variety of functional groups such as halogen, cyano, ketone, amide, and ester moieties.

[References]

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