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PRESS RELEASE

10 March 2023

Chiyoda Corporation
University of Toyama
HighChem Co., Ltd.

Developing the Technology to Produce p-Xylene from CO_2

～The First Successful Production / Purification of p-Xylene～

Chiyoda Corporation (Chiyoda), the University of Toyama and HighChem Co., Ltd. (HighChem) are pleased to announce the first successful production and purification of p-Xylene from CO_2.

Chiyoda, the University of Toyama, HighChem, Nippon Steel Engineering Co., Ltd., Nippon Steel Corporation and Mitsubishi Corporation have been collaborating on producing p-Xylene from CO_2 following selection for the NEDO*2 project, 'Development of Technologies for Carbon Recycling and Next-Generation Thermal Power Generation', including reduction of CO_2 emissions and utilizing CO_2 for chemical materials.

Since March 2022, Chiyoda's pilot plant in Koyasu Research Park (Figure 1) has used HighChem's industrial catalyst (Figure 2) based on achievements of research by the University of Toyama to produce p-Xylene compounds utilizing CO_2 as feedstock, and purified p-Xylene (Figure 3) in external facilities using conventional methods. This achievement accelerates the commercialization of the technology.

Reducing CO_2 emitted from factories, power plants etc using technological options, including carbon recycling technologies, is essential to combat climate change. The 'Roadmap for Carbon Recycling Technologies' formulated by METI*3 in June 2019 (revised in July 2021), establishes guidelines for utilizing carbon recycling technologies to separate and collect CO_2 as a resource, and reuse it in the form of diverse carbon compounds for chemical materials and fuels.

NEDO therefore supports an advanced technology development project to produce industrial p-Xylene from CO_2 to substitute existing fossil fuel-derived chemicals.

Figure 1 : Pilot plant in the Chiyoda Koyasu Research Park

Figure 2 : HighChem's industrial catalyst

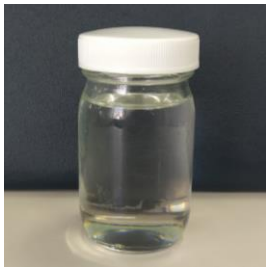
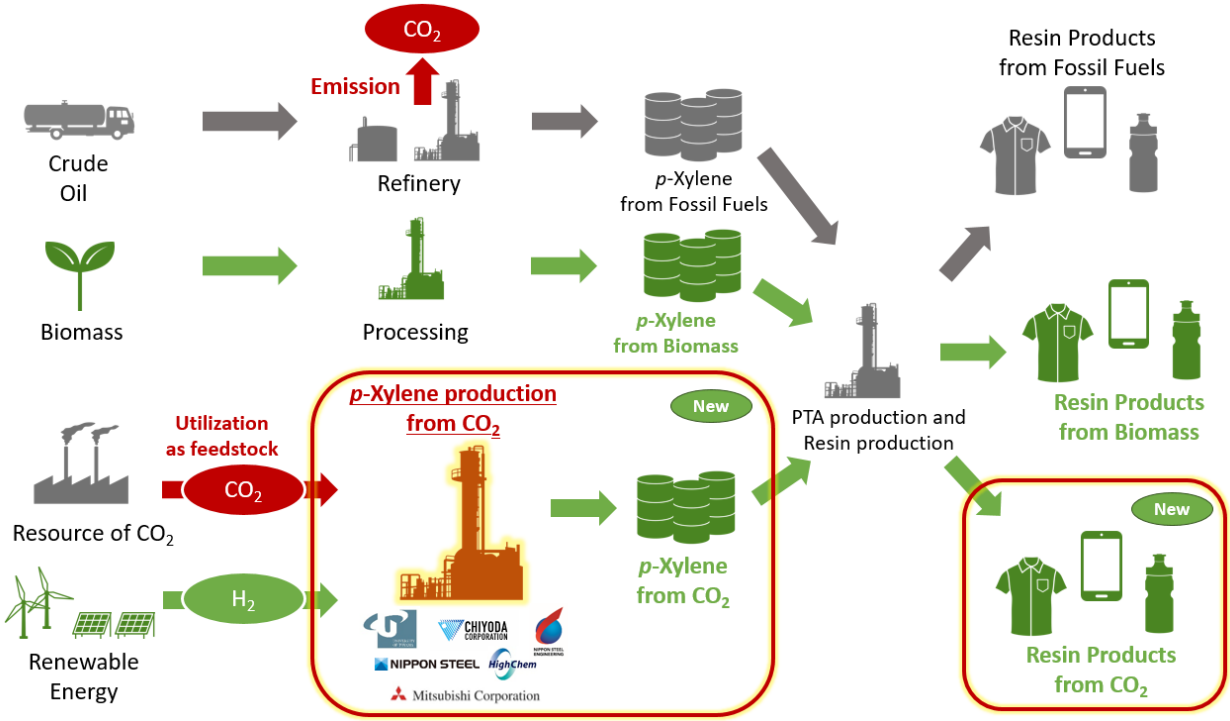


Figure 3 : First purified p-Xylene produced from CO_2

p-Xylene produced from CO_2, as with conventional p-Xylene, is applicable to many types of resins and relevant chemicals via Purified Terephthalic Acid*4 (PTA). However, resins and chemicals produced from CO_2 benefit the environment by enabling carbon recycling and reducing CO_2 emissions (Figure 4).

Commercializing with the Mass Balance Approach*5 (as one potential procedure) enables p-Xylene produced from CO_2 to be incorporated into the conventional p-Xylene supply chain, delivering the advantages of CO_2 emission reduction to the market.



Key themes : Climate change measures, carbon recycling, reducing GHG emissions, CCUS

Figure 4 : p-Xylene Supply Chain from CO_2

*1 Para-Xylene - an aromatic hydrocarbon; one of three isomers of dimethyl-benzene known as Xylenes with the chemical formula C_8H_{10} and a precursor of Terephthalic Acid

*2 The New Energy and Industrial Technology Development Organization

*3 Ministry of Economy, Trade and Industry

*4 Purified Terephthalic Acid ($C_8H_6O_4$), produced by catalytic oxidization of p-Xylene. PTA is important to various kinds of resins as monomers and precursors of functional chemicals such as plasticizers.

*5 Sustainability product certification scheme allowing sustainable value attribution to certified products within the rate of sustainable feedstock use.

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Major Business: C1 Chemical Business (License of SEG® technology - Syngas to Ethylene Glycol, another material of Polyester, Catalyst Production), Functional Materials & Energy Business (Biodegradable plastic, H_2 Energy), Trading Business (Chemical Products)