

[超 臨 界]

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超臨界二酸化炭素中でのポリエステル 酵素合成とケミカルリサイクル

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Enzymatic Synthesis and Chemical Recycling of Polyester
in Supercritical Carbon Dioxide
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Organic solvent-free enzymatic transformation of poly(ϵ -Caprolactone) (PCL) and poly(butylenes adipate) into repolymerizable oligomers in supercritical carbon dioxide (sc CO₂) using an enzyme was carried out directed towards the establishment of a sustainable chemical recycling. The enzymatic transformation of PCL having an *Mn* of 110,000 using *Candida antarctica* lipase in scCO₂ containing a small amount of water at 40°C quantitatively afforded the corresponding repolymerizable cyclic oligomer.

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超臨界流体中におけるエステル交換反応

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Transesterification in Supercritical Fluid
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the mixture of the cyclic bisphenol-A type oligocarbonate (c-4mer) with linear polycarbonate was converted to the high Mw polymer over 300°C. Under the 0.1 MPa-N₂ or CO₂, the starting mixture (Mw=1,900) gave a polymer (Mw=3,600) by heating (320°C, 20 min). On the other hand, the polymer from the reaction in a supercritical carbon dioxide (30 MPa, 320°C, 20 min.) showed higher Mw (Mw=9,600). It is shown that supercritical carbon dioxide is a good thermal media for the transesterification.

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超臨界二酸化炭素を用いる環状カーボネートの合成

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Synthesis of Cyclic Carbonate Using Supercritical Carbon Dioxide

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Cyclic carbonate, 4-Methyl-1,3-dioxolan-2-one, was synthesized from carbon dioxide and 2-methyloxirane. The reaction was accelerated and almost 100% product yield was realized in the supercritical region of the mixture of the reactants and products, while the catalyst did not dissolve in the supercritical mixture.

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超臨界水を用いる廃プラスチックのガス化技術

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Gasification of Waste Plastics using Supercritical water

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Polyethylene and dechlorinated poly vinyl chloride were gasified at 650 . In the case of pyrolysis, the total volume of the gas produced was very small. Using supercritical water, the total volume of the gas increased much. In the presence of Ni catalyst under supercritical water condition, the volume of the gas, especially hydrogen gas, increased remarkably.