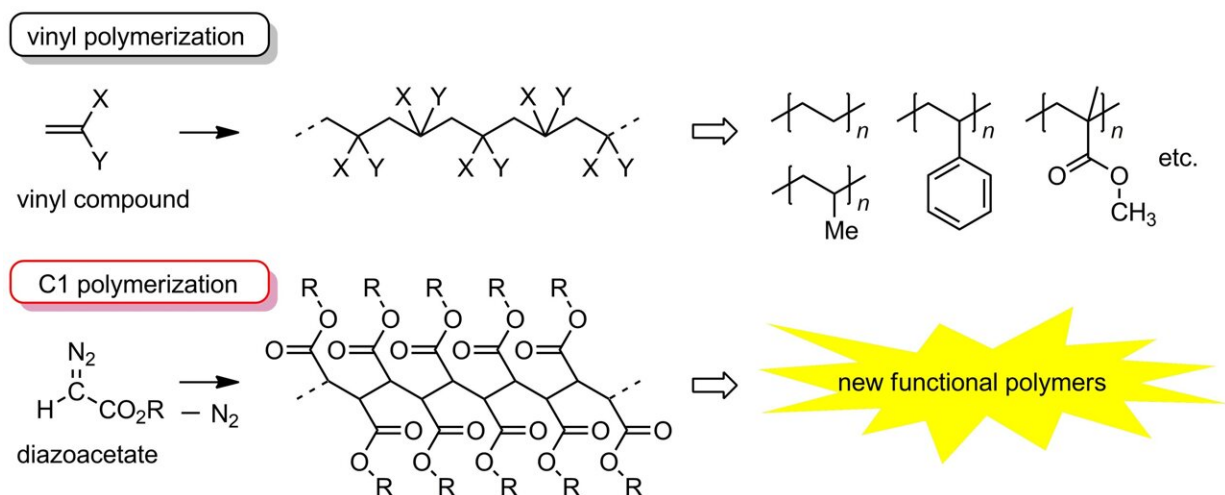


Development of atactic C-C main chain polymer with a high melting point

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Vinyl polymerization and C1 polymerization. Credit: Ehime University

Polymers with carbon–carbon (C-C) bonds (C-C polymers) in the main chain skeleton such as polyethylene and polypropylene are important industrial materials and are utilized as common plastics.

Most C-C polymers have been prepared by vinyl polymerization, where starting materials (monomers) with a C=C double bond such as ethylene and propylene were used for their production. Researchers from Ehime University have succeeded in developing an alternative method for preparing C-C polymers using diazoacetate as a monomer, where the C-

C bonds are constructed from C1 units derived from the monomer.

The polymers obtained by the latter method (C1 polymers) are expected to become new polymer materials with useful properties that cannot be obtained by vinyl polymerization. The work is published in the journal *Macromolecules*.

In general, imparting high crystallinity to polymers is an effective method for improving the strength and durability of the materials, and high crystallinity is achieved by high stereoregularity in the polymer main chain. Accordingly, polymers with low stereoregularity (atactic polymers) tend to be less valuable materials; for example, polypropylene can be a useful material only when its C-C bonds are highly stereoregulated. As for C1 polymers, whereas highly stereoregulated polymers with high crystallinity have been reported, atactic C1 polymers are amorphous with a relatively low melting point, as well.



bonding interaction.

These results provide a new insight into the thermal properties of C-C polymers and is expected to be applied to new [polymer](#) material design.

More information: Hiroaki Shimomoto et al, Effect of the Alkyl Side-Chain Structure on Melting Point of Atactic Poly(alkoxycarbonylmethylene)s: Incorporation of Amide-Linkage Leading to Polymers with High Melting Point, *Macromolecules* (2023). DOI: [10.1021/acs.macromol.3c00635](https://doi.org/10.1021/acs.macromol.3c00635)

Provided by Ehime University

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