

Technology

## Development of Though Hydrogels by Focusing on Monomer Structure and Polymerization Mechanism

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Tokushima University PR: Polymerization Rate (1) NH  $0 \neq$ Hydrophobicity Hydrophilicity Slow Fast PR **Hydrophobic** Hydrogen Intermol. interaction bonding Interaction **Before Early Stage** Later Stage Entanglement Entanglement network network Homogenous with hydrophilic with hydrophilic networks monomers (2) **Hydrophilicity Hydrophobicity** Type Radical Polyaddition PR Fast Slow **Hydrophobic** Intermol. Hydrogen bonding Interaction Interaction

Content:

## **Development of Tough Hydrogels**

By introducing intermolecular interactions into the gel, molecular interactions can preferentially fragmentation when mechanical loads are applied, allowing for the consumption of mechanical energy. Intermolecular interactions in the gel is key point.

Two methods have been employed to develop tough hydrogels, with the aim of efficiently introducing intermolecular interactions into the gel:

## (DExploiting Differences in Polymerization Reactivity (Radical Polymerization)

Radical polymerization is carried out using two monomers with significantly different polarities and polymerization rates simultaneously. This leads to the preparation of a hydrogel where molecular entanglement is promoted, resulting in a tough hydrogel.

## ②Combination of Two Polymerization Mechanisms

Combining a monomer that undergoes radical polymerization and a monomer that undergoes addition polymerization, both polymerization mechanisms are employed simultaneously to prepare the hydrogel. This approach results in a tough hydrogel.

Keywords: Hydrogel, Radical Polymerization, Polyaddition

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