Synthesis of Biocompatible Materials through Regio-/Stereoselective ROMP

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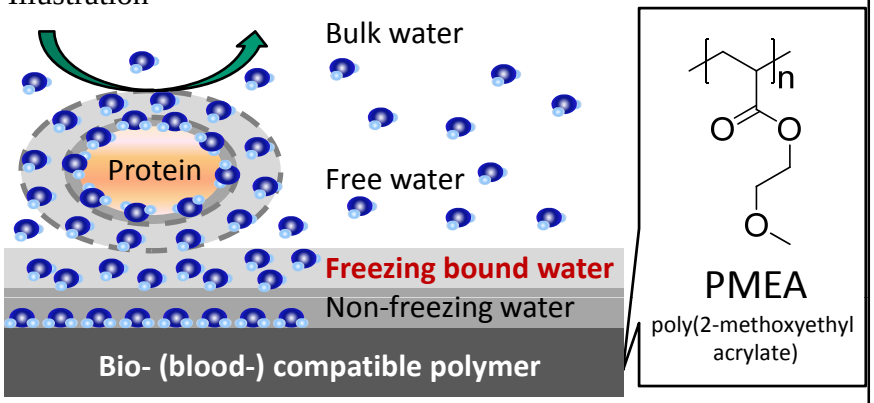
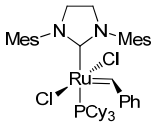
Illustration



Schematic representation of water at the biocompatible PMEA surface having good anti-fouling property.

R: MeO, EtO, PEG, betaines, etc.

regio- and stereo-***regular*** polymer



Grubbs catalyst ***G2***

Regioselectivity >96%

branches on every 8th backbone carbon

Stereoselectivity >96%

high trans- olefinic double bond content

Regio-/stereoselective ROMP using Grubbs G2 catalyst

Content:

Biocompatible polymer materials are generally possessing hydrophilic functional groups such as hydroxyl, PEG, peptide, and betaine; thus, the polymer surface shows a strong hydrophilicity. A unique type of water layer at the hydrated polymer surface classified as “freezing bound water layer” plays an important role in the biocompatibility of polymer materials.

We focus our research effort on investigating the role of the freezing bound water layer at the polymer surface in biocompatibility. In addition to the development of the relationships between the polymer chemical structure and the water structure at the surface, we strive to determine the mechanism of biocompatibility to cells.

The polymers having hydrophilic functional groups are synthesized through a unique ring-opening metathesis polymerization (ROMP) technique; regio- and stereoselective ROMP allows introducing the functional groups along the polymer backbones with regulated 1) chemical class, 2) number, 3) position, 4) sequence.

Ultimately, we aim to control the biocompatibility of the polymer materials by precise control over the polymer structure.

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