

Signal-receptive, Permeability-controllable Capsule Membranes. Polymer-Grafted Capsule Membranes

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Nylon capsule membranes (diameter: 2 mm, membrane thickness: 1 μm) were prepared by an interfacial polymerization, and polymer chains were grafted on the capsule membrane. When the polymer having dissociate side chains, such as $-\text{COOH}$ and $=\text{NH}$, was grafted on the capsule, permeability of water-soluble probes such as NaCl in the inner aqueous phase could be controlled reversibly responding to changes of ambient pH of the outer aqueous phase. This is explained by the conformation changes of the grafted polymer chains on the membrane responding to the pH changes. The capsule membrane responding to temperature changes, redox reactions, protein-saccharide interactions, and antigen-antibody interactions could be prepared by changing the grafted polymer. When enzymes were immobilized on the side chains of the grafted polymers, the capsule acts as a bioreactor.