

## Permeability-Controllable Microcapsule Membranes Responding to Outside Ionic Concentrations

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### Summary

We prepared novel functionized nylon capsule membranes whose porous membranes were corked with synthetic lipid multibilayers. The capsule is formed from physically strong, ultrathin nylon membranes and corking lipid bilayers act as a permeation valve responding to outside effects such as an ionic strength. When phospholipids having phosphate head groups were used as a corking lipid on a capsule membrane, permeations through the lipid-corked capsule membrane of water-soluble substances (NaCl) stored in the inner aqueous phase were reversibly controlled by stimuli from outside such as ambient pHs and  $\text{Ca}^{2+}$  ions. Thus, permeation rate of NaCl from inside was increased by the addition of 1 mM of  $\text{Ca}^{2+}$  ions and then reverted to the original rate by the addition of EDTA into the outside solution. These reversible permeation changes were observed only at the fluid liquid crystalline state of corking lipid molecules.

Their signal-receptive permeation could be explained by changes in the structure of lipid bilayer membranes corked in the capsule membrane, which act as a permeation valve.