No. 1306

Polymeric Pseudo－Liquid Membranes: Recovery of Maritime Metal Resources and Environmental Protection

Masakazu Yoshikawa

Department of Biomelecular Engineering Kyoto Institute of Technology

Summary

Membrane separation is perceived to be an environmentally benign separation technology compared with other separation methods. Membranes have been gathered attentions since they are expected to solve problems the globe has faced and have to be immediately solved. Membranes have been already applied to many fields.

Systems for membrane separation can be divided into two categories, such as liquid membranes and solid membranes. The former directly and effectively reflects the affinity of the molecular recognition material (transporter or carrier), which is found in the liquid membrane. In addition to this, a construction of liquid membrane is easy, that is, dissolution of the carrier into a given solvent is just a manipulation that membranologists have to do. However, the drawback of a liquid membrane is its lack of long-term stability; the solvent consisting of membrane solution may evaporate, or the carrier and/or carrier /target molecule complex may be washed out during operation. If these drawbacks are eliminated, a liquid membrane is a promising membrane system for the separation of target molecule from a mixture containing compounds with similar or same molecular dimensions and compounds that exhibit similar or the same chemical and/or physical properties.

There have been various approaches to endow liquid membranes with durability; (1) polymer liquid crystal composite membranes, (2) polymer inclusion membranes, (3) organogel membranes, (4) stabilization of supported liquid membranes, (5) room temperature ionic liquids, and (6) polymeric pseudo-liquid membranes (PPLMs). PPLM is a liquid membrane that consists of polymeric materials in a rubbery state and a carrier for a given target molecule. In PPLMs, polymeric materials, which show rubbery state and fluidity, are chosen as membrane components dissolving a carrier and working as a barrier separating source and receiving phases. Exploration of more suitable membrane materials for PPLMs is not only an interesting but also an indispensable approach.

In the present study, the transport of KCl and CsCl through PPLMs from polyoleylacrylamide (PC18AAm) and dibenzo-18-crown-6 (DB18C6) for KCl or dibenzo-21-crown-7 (DB21C7) for CsCl were investigated.