

論文名：

Preparation and excellent oxygen permeability of novel chemically-modified membranes of oligosiloxane-containing copolyacetylenes by photodegradation and cross-linking reaction

光分解と架橋反応により化学修飾された新規なオリゴシロキサン含有アセチレン共重合体膜の調製と優れた酸素選択透過性

(要約)

新潟大学大学院自然科学研究科

氏名 張 明宇

Two novel single substituted phenylacetylene monomer **1** and **2** were synthesized, homopolymerized and copolymerized with each other. The membranes of the (co)polymers were prepared and the O₂/N₂ permselectivity had been detected. The best separation plot of the membrane (copoly_a (**1/2'**) (70:30)) had passed Robeson's upper bound (1991). After heat treatment for the membrane of poly_a (**1**), the gas permeability and selectivity were changed obviously.

Four new partly modified membranes of novel (co)polyacetylenes having a photodegradative backbone and crosslinkable side chains showed excellent performances as oxygen permselective membranes, that is, ultrahigh oxygen permeability (P_{O_2}) with relatively high oxygen permselectivity ($\alpha = P_{O_2}/P_{N_2}$). In α vs. P_{O_2} plots, two of them showed a performance close to Robeson's upper bound 2008 and the other two exceeded Robeson's upper bound 1991. The combination of the rigid main chain of the (co)polymers, the regular structure of the supramolecular polymer, and the flexible crosslinking structure may have produced these excellent performances.

After aging treatment, the permeation of all the membranes were improved, but selectivity were decreased to nearly none. It showed that aging effect could guide Knudsen diffusion.