# Photocatalytic membrane reactor for reduction in fouling

Toshinori Tsuru

Hiroshima University, Department of Chemical Engineering, Japan
Higashi-Hiroshima 739-8527, JAPAN

## Summary

Nanoporous $TiO_2$ membranes (1cm in diameter, 9cm in length) which were prepared by coating colloidal $TiO_2$ sol solutions on the outer surface of cylindrical porous membranes (average pore diameter 1μm) and firing at 450ºC, were applied to a photocatalytic membrane reactor. A photocatalytic membrane reactor is a system where feed stream is forced to permeate through the membrane and organic pollutants can be degraded by photocatalytic reaction on the permeate side. The molecular sieving and the photocatalytic reaction can be combined to improve the selectivity. Methylene Blue (MB) was used as a model solute under the irradiation of blacklight lamps (BL) for a photocatalytic reaction. $TiO_2$ membranes, having an average pore diameter of 10nm, showed 60% rejection of MB based on the molecular sieving effect without BL irradiation. The rejection of MB increased under BL irradiation, depending on experimental conditions such as feed concentration and applied pressure. Permeate volume flux without BL irradiation decreased with an increase in feed concentration of MB because of pore blocking by MB. On the other hand, the permeate flux increased with BL irradiation and showed approximately constant values irrespective of MB concentration. It was suggested that the permeate flux was recovered by photocatalytic degradation of MB which fouled the membranes.