

## Synthesis and Water/Ethanol Separation of NaA Zeolite Composite Membranes

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NaA zeolite composite membranes were prepared using a tubular alpha-alumina support by the secondary growth process and the pervaporation performance was characterized in water/ethanol mixtures. Crystalline phase and morphology of formed zeolite separation layers were analyzed by X-ray diffraction and scanning electron microscopy, respectively. Molar ratio of Si to Al in zeolite separation layers was evaluated by EDS analysis. Water/ethanol separations were characterized by using FID-GC and HPLC. Zeolite separation layers formed in  $\text{Al}_2\text{O}_3\text{-}2\text{SiO}_2\text{-}4.5\text{Na}_2\text{O}\text{-}600\text{H}_2\text{O}$  solution has a uniform thickness of 4-5mm and a uniform Si/Al molar ratio of around 1, and the layers showed a ultra-high and reliable separation behavior in pervaporation experiments with using 95wt%-EtOH mixture: the water flux was 500 to 1200g/m<sup>2</sup>hr and the water/ethanol separation factor was 3000 to 14000. The ultra-high water/ethanol separation was from the uniform and defect-free zeolite layers formed on the alpha-alumina support. In the present study, relationship between the microstructure of formed zeolite layers and the water/ethanol separation will be reported in-detailed.