

Nanostructured Titania Membranes with Improved Thermal Stability

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Nanostructured titania membranes have received significant attention in recent years because of their unique characteristics such as high water flux, semiconductance, photocatalysis, and chemical resistance over other membrane materials. The potential applications of titania membranes include ultrafiltration processes and catalytic/photocatalytic membrane reactor systems. However, their practical applications are limited due to the reduction of porosity and surface area at the elevated temperatures. Hydrothermal process is a low temperature crystallization method, which can produce thermally stable crystalline titania particles. Although hydrothermal process has been used as an independent process to produce ultrafine crystalline oxide particles, this process can be also combined with sol-gel process to promote crystallization of sol-gel products under mild conditions. In this work, hydrothermal process was combined with sol-gel process to improve the thermal stability of titania membranes. The phase structure and pore structures of the unsupported membranes were investigated as a function of calcination temperature.