



# Zeolite Nanosheet Membrane Process (20110221, Dr. Michael Tsapatsis)

Technology No. 20110221

**IP Status:** Issued US Patent; **Application #:** 14/130,589

## Zeolite Nanosheet Membranes for use as a Molecular Sieve

A method of zeolite membrane fabrication that gives high aspect ratio nanosheets with high purity and precise pore structure has been developed. When combined with other technologies created by the research group, such as structure preservation, oriented growth and rapid thermal processing, zeolite membranes can be fabricated that have high flux and highly selectivity using a simple and scalable process. The process allows for thin film (<500nm) formation without cracks while minimizing other non-selective defects.

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# Large Scale Zeolite Nanosheets with High Flux and Selectivity

Many industrial processes include steps which involve the separation of specific compounds. Zeolites, often used as a molecular sieve, are ideal for this process, but their implementation has been hindered by the difficulty in producing large sheets with good selectivity and high flux. The described invention is a process for producing large scale zeolite nanosheet membranes with high purity and precise pore structure with an estimated cost reduction of ten times compared with conventional fabrication methods. Potential uses include the separation of ethanol/butanol and water in biofuel production, lowering the cost and energy intensity of these processes.

## **BENEFITS OF ZEOLITE NANOSHEET MEMBRANES:**

- Lower cost than current zeolite manufacturing technology.
- Produces large ( $\text{m}^2$ ) zeolite nanosheets ( $<500\text{nm}$ ) with high flux and high selectivity.
- The process forms zeolite nanosheets without crack formation and minimizes other non-selective defects.
- Acts as a molecular sieve for separation processes such as ethanol/butanol from water, carbon dioxide from methane and linear hydrocarbons from branched hydrocarbons.

**Fulfillment Details** Licensee will receive rights to practice the intellectual property (patent application) for the purposes of developing and manufacturing a commercial product.

**Phase of Development** Proof of concept. Small-scale working prototype.

## **Researchers**

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