



# Direct Synthesis of High Aspect Ratio Zeolite Nanosheets

**IP Status:** Pending US Patent; **Application #:** 15/791,876

## Zeolite Nanosheets with Nanometer Thicknesses

A newly developed direct synthesis method creates zeolite nanosheets with nanometer thicknesses and a high aspect ratio. The process creates zeolite nanosheets with enhanced mass transport properties within their nanopores, favorable to applications such as catalysis and separation. The nanosheets feature many desirable characteristics: predominant thickness of 5nm (2.5 unit cells), 0.6 nm straight pores down their thin dimension, and basal dimensions of several micrometers. For example, the material includes a planar layer of MFI zeolite where the planar layer ranges in thickness between 4 nm and 10 nm for at least 70% of a basal area of the planar layer. The direct synthesized nanosheets exhibited superior selectivity and flux compared to the state-of-the-art membranes made with exfoliated nanosheets or conventional crystals.

### MN-IP Try and Buy

#### Try

- Trial period is six months
- Trial fee is \$5000
- Trial fee is waived for MN companies or if sponsoring \$50,000+ research with the University
- No US patent expenses during trial period

#### Buy

- \$25,000 conversion fee (TRY to BUY)
- Royalty rate of 3% (2% for MN company)
- Royalty free for first \$1M in sales

## Improved Zeolite Membrane

Previous methods of preparing zeolite nanosheets are time-consuming, costly, low-yield and result in fragmented nanosheets with sub-micrometer lateral dimensions. This direct synthesis method provides a viable path to high-aspect-ratio zeolite nanosheets, with improved yield at a lower cost.

### BENEFITS AND FEATURES:

### Technology ID

20170075

### Category

Engineering & Physical  
Sciences/Materials  
Engineering & Physical  
Sciences/Nanotechnology

### Learn more



- Direct synthesis; easier to prepare
- Nanometer thicknesses: between 4 nm and 10 nm for at least 70% of a basal area of the planar layer
- Superior selectivity and flux
- Enhanced mass transport properties within their nanopores
- High aspect ratio
- Higher yield
- Potentially lower cost

**APPLICATIONS:**

- Zeolite membranes
- Chemical / petroleum separation equipment
- High-performance separation membranes
- Catalysis and separation

**Phase of Development** - Prototype developed

**Researchers**

Michael Tsapatsis, PhD

*Professor, Chemical Engineering and Materials Science*

[External Link](http://www.cems.umn.edu) (www.cems.umn.edu)

Andre Mkhoyan

*Associate Professor, Chemical Engineering and Materials Science*

[External Link](http://www.cems.umn.edu) (www.cems.umn.edu)

J. Ilja Siepmann, PhD

*Professor, Department of Chemistry*

[External Link](http://chem.umn.edu) (chem.umn.edu)

**Publications**

[\*Ultra-selective high-flux membranes from directly synthesized zeolite nanosheets\*](#)

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