

# Molecularly Mixed Composite Membranes

---

## Homogenously mixed matrix membranes beneficial to molecular separation processes

Georgia Tech Inventors from the School of Chemical Engineering synthesized amorphous scrambled porous organic cages (ASPOCs) from organic linker mixtures. The cages are amorphous due to different functionalities on their vertices. Their solubility in organic solvents allow for homogenous, molecular-level mixing with polymer matrices. Due to this critical property, ASPOCs simplifies the preparation of and processing of mixed matrix membrane casting and can be used in industrial molecular separation processes such as.

### Summary Bullets

- **Simplifies preparation**- membrane casting solution and processes made easier using organic cages
- **Reduce defect formation**- interactions between filler and polymer matrices are dramatically improved compared to traditional filler materials (e.g., zeolites, metal-organic frameworks), contributing to less defects in membrane formation

### Solution Advantages

- **Simplifies preparation**- membrane casting solution and processes made easier using organic cages
- **Reduce defect formation**- interactions between filler and polymer matrices are dramatically improved compared to traditional filler materials (e.g., zeolites, metal-organic frameworks), contributing to less defects in membrane formation

### Potential Commercial Applications

- Nanofiltration of alcohol solutions
- Desalination
- Pharmaceutical purification

### Background and More Information

Porous organic cages (POCs) are individual molecules that are permeable and soluble in common solvents. The organic cages are first synthesized then separately and assembled into a solid state to allow for solution-processing tunability. Conventional membranes composed of crystalline or particulate fillers suffer from agglomeration and poor dispersion throughout the suspension. These POC membranes are soluble and have the advantage of integrating well within the membranes and matrix polymers.

## **Inventors**

- Dr. Ryan Lively  
Assistant Professor – Georgia Tech School of Chemical and Biomolecular Engineering
- Guanghui Zhu  
PhD Candidate – Georgia Tech School of Chemical and Biomolecular Engineering

## **IP Status**

:

## **Publications**

, -

## **Images**

Visit the Technology here:

[Molecularly Mixed Composite Membranes](#)

---

<https://s3.sandbox.research.gatech.edu//print/pdf/node/3638>