

# CytoVu<sup>®</sup> for live cell imaging

Nanotechnology comes to cell culture

## Transparency for live cell imaging

The first transparent membrane enables confocal slicing of cells on both surfaces at all visible wavelengths

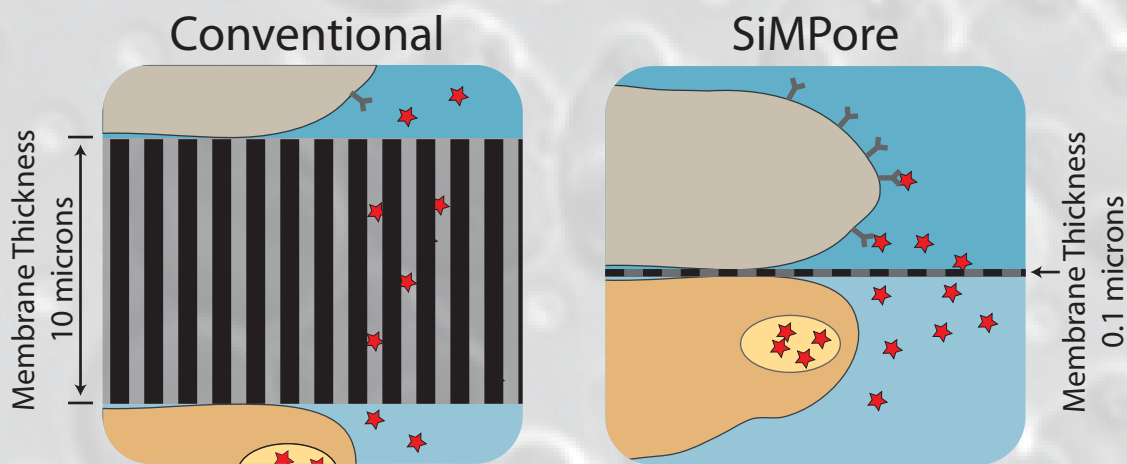
## Co-Culture as nature intended

The world's thinnest\* membrane physically separates cells by as little as 0.1 microns

### SiMPore's CytoVu<sup>®</sup> imaging slide

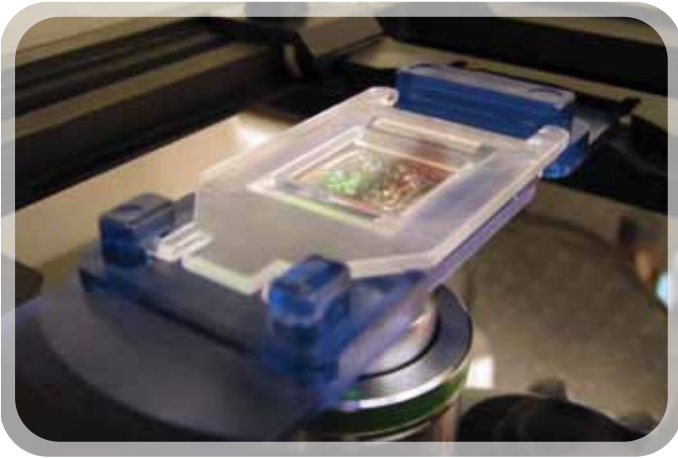


Minimize the membrane - Focus on what's important



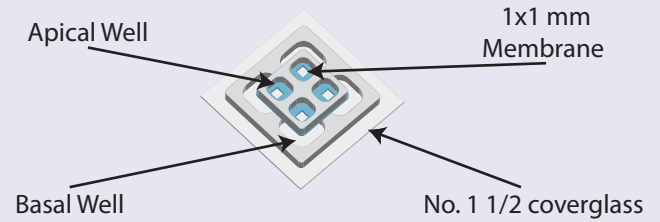
# CytoVu®

## SiMPore Membrane Support



### Available in three configurations:

- **With NanoBarrier™**  
for permeability & physically separate co-culture
- **Without NanoBarrier™**  
for contacting co-culture or transmigration
- **With Degradable NanoBarrier™**  
for full length contact and tissue engineering



**Schematic of cell culture wells**  
(coverglass is bonded to plastic slide carrier)

### Thin

SiMPore's CytoVu® imaging slides provide a permeable platform for cell culture on both apical and basal sides. At just 0.1 µm thin, the membrane in the CytoVu® imaging slides provides superior live cell imaging, and enables confocal slicing of cells on both surfaces and at all visible wavelengths.

### Porous

NanoBarrier™ technology provides a highly permeable barrier between compartments. It has many small, 50 nm, pores that allow superior diffusion of molecules between co-cultured cells while maintaining physical separation. SiMPore also offers 3 & 8 µm pores without NanoBarrier™ technology to enable invasion and migration assays or co-culture with physical contact.

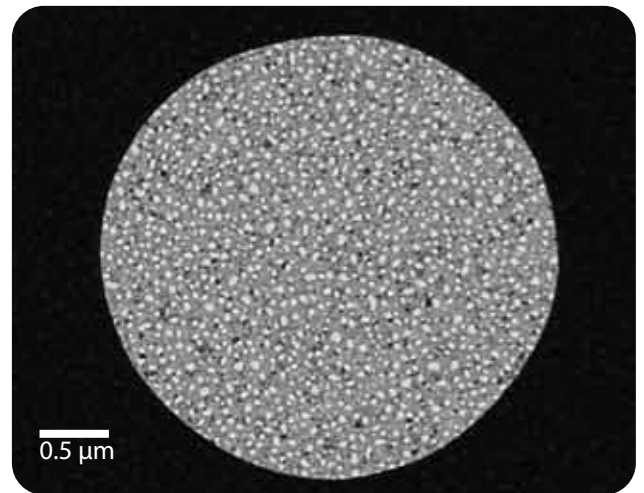
### Novel

SiMPore also offers a degradable version of the NanoBarrier™ membrane for tissue engineering experiments. The membrane provides an initial permeable barrier to allow cells to grow to confluence, then degrades to bring the cells into complete physical contact.

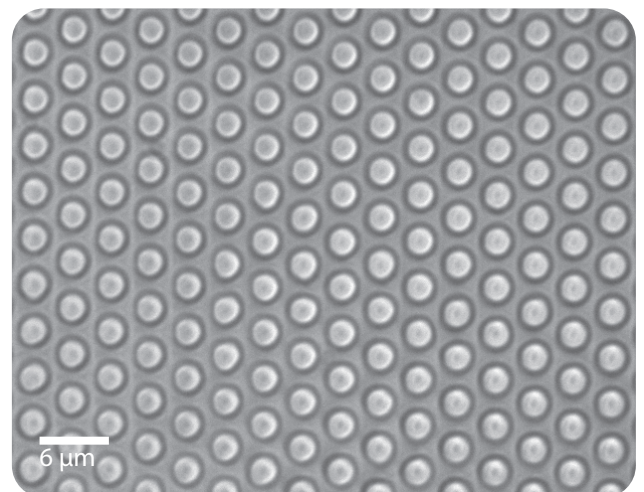
### SiMPore Inc.

SiMPore designs and produces membranes and membrane-enabled products based on its unique patent-pending platform NanoBarrier™ technology – the ultrathin nanoporous silicon membrane. It is the world's first membrane to offer both tunable nanometer-scale thickness and pore size. SiMPore's products include filters for separating and concentrating nanomolecules, electron microscopy grids for preparing and imaging samples at the nanoscale, and substrates for cell culture and co-culture.

### CytoVu® with NanoBarrier™ - TEM

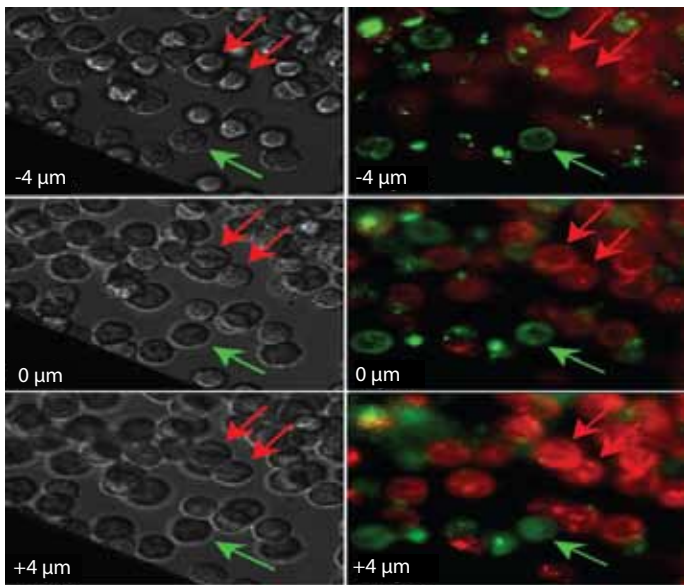


### CytoVu® with NanoBarrier™ - Optical



# Advantages and Applications

Features	Benefits
Optical transparency	Visualization in brightfield and fluorescence
Higher permeability rates	Cross-communication and low dose studies
Molecular thinness	Physical separation with physiological co-culture environment
Degradable nanoporous membranes	Novel tissue engineering platform
Scaled-down feature size	Precious reagent reduction
Adapts to both inverted and upright microscopes	No new equipment required
Multiple basal well depths	Compatible with high magnification objectives
Stackable ridges on the outside	Saves incubator space



## Transparent Co-Culture Imaging

DIC and wide-field fluorescence images were captured at -4, 0, and +4  $\mu\text{m}$  from the membrane plane. CytoVu<sup>®</sup> imaging slides allowed for clear resolution of red-tagged human neutrophils plated on the top of the membrane (+4) and of green-tagged human neutrophils plated on the bottom of the membrane (-4).

Never before has this level of transparency been available for co-culture techniques. Just 0.1  $\mu\text{m}$  thin and porous for the highest level of permeability, SiMPore membranes are ideal for cellular co-culture.

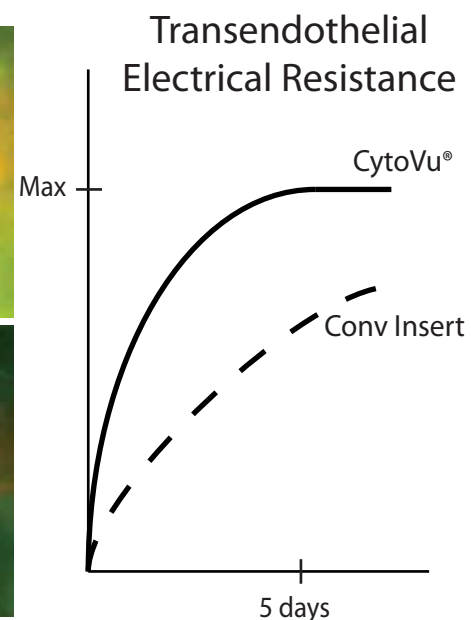
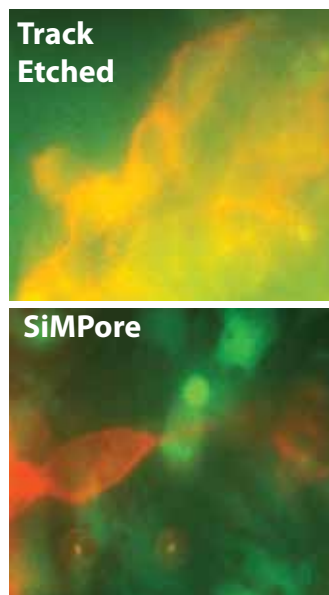
CytoVu<sup>®</sup> lets you co-culture directly on the top and bottom of the membrane bringing cells close enough for physiologically relevant paracrine communication.

## Tissue Engineering

Endothelial (green) and glial (red) cells were cultured on a CytoVu<sup>®</sup> imaging slide to create a more physiological blood brain barrier (BBB) model. CytoVu's<sup>®</sup> pores and molecular thinness allow for highly efficient communication between the cells creating a tighter BBB than standard track-etched membranes.

The membrane is thinner and has a lower capacity to trap dye molecules than standard track etched membranes giving you the highest possible resolution of your engineered tissue.

Degradable NanoBarrier™ membranes are designed to degrade after your cells have grown to confluence giving you the opportunity to establish the true physical contact that nature intended.



# Application and Specification Guide

	with NanoBarrier™	Degradable NanoBarrier™	without NanoBarrier™
Cell Co-culture	✓	✓	✓
Tissue Engineering	✓	✓	
Cell Diff/Dev	✓	✓	✓
Cell Invasion/Migration			✓
Drug Absorption	✓	✓	
Polarized Cell Growth	✓	✓	✓
High Quality Imaging	✓	✓	✓

Cell-Cell Contact	Restricted		Full		Allowed	
Thickness (µm)	0.1		0.1		0.1	
Pore Size (µm)	3 or 8		∞		3 or 8	
Permeability	High		High		High	
Active Dimensions (mm)	1.0 x 1.0		1.0 x 1.0		1.0 x 1.0	
Stability in Culture	2 weeks		1-3 days		4 weeks	
Basal Well Depth (µm)	300	1000	300	1000	300	1000
Apical Well Volume (µl)	10	10	10	10	10	10
Basal Well Volume (µl)	10	25	10	25	10	25
CytoVu® 3 Micro P/N	C300-MP3NP50	C1000-MP3NP50	---	---	C300-MP3	C1000-MP3
CytoVu® 8 Micro P/N	C300-MP8NP50	C1000-MP8NP50	---	---	C300-MP8	C1000-MP8
CytoVu® P/N			C300-NP50-D	C1000-NP50-D		

For additional technical or sales information, please visit [www.SiMPoreStore.com](http://www.SiMPoreStore.com) or call us at 585-214-0585 or toll free at 888-323-6266



150 Lucius Gordon Drive, Suite 119  
West Henrietta, NY 14586  
Tel: 888-323-NANO  
Tel: 585-214-0585  
Fax: 888-249-2935  
Email: [info@simpore.com](mailto:info@simpore.com)  
Web: [www.SiMPoreStore.com](http://www.SiMPoreStore.com)  
Web: [www.SiMPore.com](http://www.SiMPore.com)

CytoVu® is a registered trademark of SiMPore, Inc.  
NanoBarrier™ is a trademark of SiMPore, Inc.  
Patent Pending

## Publications

*Porous nanocrystalline silicon membranes as highly permeable and molecularly thin substrates for cell culture.* Agrawal, A. A., Nehilla, B. J., Reisig, K. V., Gaborski, T. R., Fang, D. Z., Striemer, C. C., Fauchet, P. M. & McGrath, J. L. **Biomaterials** (2010) 31, 5408-5417.

*A structure-permeability relationship of ultrathin nanoporous silicon membrane: a comparison with the nuclear envelope.* Kim, E., Xiong, H., Striemer, C. C., Fang, D. Z., Fauchet, P. M., McGrath, J. L., Amemiya, S., **J. Am. Chem. Soc.** (2008) 130, 4230-4231

*Charge- and size-based separation of macromolecules using ultrathin silicon membranes.* Striemer, C. C., Gaborski, T. R., McGrath, J. L. & Fauchet, P. M. **Nature** (2007) 445, 749-753.