

# MemDry: Vapor-Selective Membrane Heat Exchanger Cycle for Efficient Passive and Active Convective Drying

**Vapor-selective heat exchanger technology improves convective drying processes by reducing energy consumption by 30-40% and cutting dry times, leveraging membrane dehumidification and heat pump efficiency.**

Researchers at Purdue University have developed a vapor-selective heat exchanger cycle capable of both passive and active convective drying processes. Purdue's method reduces energy consumption by 30-40% over conventional approaches by combining vapor-selective membrane-based dehumidification with heat pump technology. Additionally, by removing vapor from the system, this technology can improve heat pump coefficient of performance (COP) by 2x and reduce required drying temperatures by 10-20 deg C. This technology has applications in commercial and residential drying processes to reduce both dry times and energy consumption while using electricity.

**Technology Validation:** This technology has been validated theoretically using thermodynamic analysis of the proposed method. Results showed a decrease in energy requirements of 30-40%, a reduction in required drying temperature, and improved heat pump COP of 2x.

## Advantages

- Improved efficiency
- Reduced dry times
- 30-40% energy reduction
- 10-20 deg C lower required drying temperatures

## Applications

- Commercial drying processes (fabrics, pharmaceuticals, chemicals, food)
- Residential clothes dryers

## Technology ID

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## Category

GreenTech/Water & Resource Management  
Materials Science & Nanotechnology/Thermal Management Materials & Solutions

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