Special Issue

Integration of Advanced Membrane Materials in Building Environmental Control Systems

Message from the Guest Editors

Advanced membrane materials are increasingly recognized as transformative components in modern building systems, offering precise control over heat, moisture, air, and pollutant transfer. Their integration into building environmental control systems represents an opportunity to enhance energy efficiency, improve indoor environmental quality, and support the sustainable operation and renovation of buildings worldwide. Topics include:

- Development and characterization of novel membrane materials for building applications.
- Membrane-integrated system design for HVAC, ventilation, dehumidification, and energy recovery.
- Modeling, simulation, and optimization of membrane-based building environmental control systems.
- Impact of membrane systems on indoor air quality, thermal comfort, and occupant health.
- Laboratory, field, and real-world performance testing and monitoring of membrane systems.
- Case studies on the integration of membranes in new construction, retrofits, and historic buildings.
- Life cycle assessment, cost–benefit analysis, and circular economy approaches for membrane materials in buildings.
- Smart and adaptive membrane systems integrated with IoT, sensors, and building automation.

Guest Editors

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About the Journal

Message from the Editor-in-Chief

Current urban environments are home to multi-modal transit systems, extensive energy grids, a building stock, and integrated services. Sprawling neighborhoods are composed of buildings that accommodate living and working quarters. However, it is expected that the cities and communities of the future will face complex and enormous challenges, including maintenance, interconnectivity, resilience, energy efficiency, and sustainability issues, to name but a few. A smart city uses advanced technologies and a digital infrastructure to improve the outcomes in every aspect of a city's operations. A smart building optimizes the experience of occupants, staff, and management by using a modern and connected environment. Innovations in technology that can bring dramatic improvements to design, planning, and policy are critical in developing the cities and buildings of the future.

Editor-in-Chief

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