SUSTAINABLE MATERIALS, PROCESSES AND SYSTEMS FOR ENERGY TRANSITION

MUR DM 118 - Advanced Gas Separation membranes for hydrogen technologies

Funded By	MINISTERO DELL'UNIVERSITA' E DELLA RICERCA [P.iva/CF:97429780584] Politecnico di TORINO [P.iva/CF:00518460019]
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Context of the research activity	In the context of decarbonization, there is a growing need for sustainable and efficient gas separation technologies to support the production of green hydrogen and other clean energy sources. Polymeric Intrinsic Microporous Membranes (PIMs) have shown great potential as an effective gas separation technology due to their unique structural properties and high selectivity. PIMs offer numerous advantages such as scalability, low-cost production, and resistance to high temperatures and corrosion. These membranes can be used in various applications including carbon capture, natural gas processing, and biogas upgrading. The development and optimization of PIMs are crucial for accelerating the energy transition and achieving the United Nations' Sustainable Development Goal (SDG) 7, which aims to ensure access to affordable, reliable, sustainable, and modern energy for all. Additionally, this project is also relevant to SDG 13, which focuses on taking urgent action to combat climate change and its impacts. Efficient gas separation by PIMs can significantly contribute to the reduction of carbon emissions, making it a vital technology in combating climate change. Therefore, the advancement of PIM-based gas separation technologies is a promising research direction for achieving a sustainable future Progetto finanziato nell'ambito del PNRR – DM 118/2023 - CUP E14D23001840006

Objectives	The research objectives of this doctoral thesis, while not limited to these, include: Synthesizing polymeric intrinsic microporous membranes (PIMs) using scalable methods, containing suitable functionalities for advanced gas separation. Developing and characterizing PIM-based membranes for gas separation applications, including testing at both laboratory and pilot scales for electrochemical and gas diffusion properties. Integrating the newly developed PIM materials into advanced gas separation devices such as pressure swing adsorption, gas permeation, and membrane distillation. The aim of this research is to advance the field of gas separation technology by developing and optimizing PIM-based membranes for enhanced gas separation and purification. The scalability of synthesis methods and membrane fabrication is crucial for potential commercialization and wider adoption of the technology

Skills and competencies for the development of the activity	We are seeking highly motivated candidates with a solid academic background in chemical engineering or chemistry to join our research team. The preferred expertise for this position includes polymer synthesis, gas separation technologies, and membrane fabrication. Experience with polymeric intrinsic microporous membranes (PIMs) and their characterization methods is highly desirable. The successful candidate will have exceptional problem-solving skills and practical laboratory experience. The ability to work independently, as well as collaboratively with a team, is crucial for this position. Strong communication and interpersonal skills are essential for presenting research findings and collaborating with colleagues and external partners.