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Inorganic metallic membranes for gas separation

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Currently, membrane technology for gas separation covers an important role in reducing the environmental impact and costs of industrial processes. In particular, it offers a number of benefits over other gas separation technologies as higher energy efficiencies, greater operational flexibility as well as simplicity of operation and maintenance. At the moment, polymeric membranes are the most widely used for gas separation. Nevertheless, some issues still remain regarding the scalability and reliability of the polymeric materials under real operational conditions, where the temperature is often too high for polymer stability. Metallic membranes, by contrast, usually require high temperature for operation and may be more beneficial in saving energy under high temperature conditions. In particular, inorganic H2 selective membranes have gained a great attention in the field of the hydrogen economy development. Due to the characteristics of hydrogen perm-selectivity with respect to all other gases, palladium and its alloys play the role of dominant material in this field. Metallic membranes could be also used for N2 removal from natural gas or from coal fired flue gases located nearby the boiler exit, which may result in increased concentrations of CO2 and pollutants with a significantly reduced gas volume in the downstream, allowing for traditional emissions controls to perform more efficiently and, consequently, lowering the overall energy consumption and capital and operating costs. However, some issues need to be addressed, such as the development of thin membranes with long-term thermal and mechanical stability and resistant to the surface poisoning.

Biography

Simona Liguori is a Physical Science Research Associate at Stanford University. She earned her MS in Chemical Engineering and PhD in Environmental Science and Sustainability. She has over 8 years of research experience in membrane and membrane reactor technology related to the highly pure hydrogen production from bio-fuels reactions via. membrane reactors and CO2 separation. She published more than 20 peer-reviewed articles; more than 10 chapters on international books on membrane science. She is a referee for several international scientific journals.

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