Tuning the gas transport of ZIF-8 Membrane on Graphene Nanoribbon for Exceptional Hydrogen/Hydrocarbons Separation

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Zeolitic imidazolate framework-8 (ZIF-8)-based membranes are promising to separate various gas mixture separation. It has been developed to control the pore size of ZIF-8. Previously tuned ZIF-8 membranes were prepared by postsynthetic modification, vapor phase ligand treatment, metal exchange and ligand exchange, which require extra steps for fabrication. Herein, graphene oxide nanoribbons (GONR) were deposited on porous polymeric support via vaccum filtration and then, ZIF-8 layer was directly grown on its top surface. Oxygen functional groups of GONR act as the aid of increasing nucleation sites for ZIF-8 film while sp^2 domain direct the growth of ZIF-8 crystals to {100} direction. The gas permeance results reveal that the pore of ZIF-8 grown on GONR is rigid, showing molecular cut-off in the range of 3.4 to 3.6 Å. The ZIF-8 membrane was more effective for hydrogen/methane and other hydrocarbons separation than previous ZIF-8 membrane on polymeric support. High permeance and selectivity for hydrogen can be attributed to the competitive adsorption mechanism of the ZIF-8 membrane.