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# Inorganic Microporous Membranes Fabricated by Atmospheric Pressure Plasma Liquid Deposition

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**Abstract :** Atmospheric pressure plasma liquid deposition (APPLD) is a novel technology used for the deposition of thin films via the injection of a reactive liquid precursor into a high-energy discharge plasma at ambient pressure. In this work, APPLD, utilising a TEOS precursor, was employed to produce asymmetric membranes consisting of a thin (100 nm) layer of deposited silica on a microporous silica support in order to assess their suitability for high temperature gas separation applications. He and $N_2$ gas permeability measurements were made for each of the fabricated membranes and a maximum ideal He/$N_2$ selectivity of 66 was observed at room temperature. He, $N_2$ and CO2 gas permeances were also measured at the elevated temperature of 673K and ideal He/$N_2$ and $CO_2$/$N_2$ selectivities of 300 and 7.4, respectively, were observed. The results suggest that this plasma-based deposition technique can be a viable method for the manufacture of membranes for the efficient separation of high temperature, post-combustion gases, including that of $CO_2$/$N_2$ where the constituent gases differ in size by fractions of an Ångstrom.

**Keywords :** asymmetric membrane, $CO_2$ separation, high temperature, plasma deposition, thin films
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