

论文

多孔基体负载的碳纳米管复合膜制备及其气体渗透性能

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摘要:

采用改进的浮动催化法在多孔 Al_2O_3 基体上制备了垂直取向的碳纳米管阵列, 并用旋转喷涂法将聚苯乙烯填充于碳纳米管的空隙, 进一步将其制备成复合碳纳米管膜, 研究了 H_2 和 CO_2 单组分在碳纳米管复合膜中的渗透性能, 实验结果表明, H_2/CO_2 的理想分离系数随着复合膜中碳管管径的减小而增大, 在管径较小的复合膜中, 气体渗透分离系数高于努森扩散限制, 达到6.25, 具有一定的分离效果. 两种气体在复合膜中的渗透率随着渗透温度的增加而减小.

关键词: 碳纳米管复合膜 渗透率 浮动催化法

Preparation and Gases Permeation Properties of Carbon Nanotubes Composite Membrane Supported by Porous Substrate

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Abstract:

Vertically aligned carbon nanotube(CNT) arrays were grown on porous Al_2O_3 substrate by improved floating catalysis method. Gaps among CNTs were sealed by polystyrene using spin-coating method, and then, the sample was prepared into carbon nanotube composite membrane. H_2 and CO_2 permeation through the prepared carbon nanotube membrane were studied. Experimental results show that the ideal selectivity of H_2/CO_2 increases with the decreasing of carbon nanotube diameter, it is higher than Knudsen limit in the membrane with smaller diameter carbon nanotubes, the ideal selectivity reaches to 6.25, gaining preferable separation results. Permeance of both gases slightly decreases when permeation temperature increases.

Keywords: Carbon nanotube composite membrane Permeance Floating catalysis method

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