

分离工程

反渗透复合膜研究(II)初生态膜的原位改性

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摘要 界面聚合是制备超薄复合膜是通过两种互不相溶的单体溶液在多孔支撑的表面进行聚合,再经热处理,洗涤等工艺后得到超薄复合膜。初生态膜(IniM)是指完成界面聚合反应而未经后处理(热处理,洗涤等)的膜。采用间苯二胺和均苯三甲酰氯通过在多孔聚砜膜上界面聚合得到初生态反渗透复合膜,再用四乙烯五胺对初生态膜进行表面原位改性,经后处理得到改性反渗透复合膜。对改性反渗透复合膜面XPS分析结果为:改性膜表面的O/N比明显低于未改性的,这说明四乙烯五胺通过反应接枝在膜表面;同时,改性膜面接触角大于未改性膜的,进一步证明了这一点。脱盐性能测试结果为:改性反渗透复合膜的水通量和NaCl脱除率随着进水pH值的增大而减小,这与未改性的反渗透复合膜变化趋势完全相反;这是因为改性反渗透复合膜面含有氨基(—NH₂)或亚胺基(=NH),当pH值增大时,其与水的亲和力减小;而未改性的反渗透复合膜表面含有羧基(—COOH),当pH值增大时,其与水的亲和力增大。

关键词

[反渗透复合膜](#) [均苯三甲酰氯](#) [初生态膜](#) [原位改性](#)

分类号

Reverse osmosis composite membrane (II) *In situ* modification of initial TFC membrane

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Abstract

Initial reverse osmosis composite membrane (IniM) is a thin-film-composite (TFC) membrane prepared through the interfacial polymerization technique without post-treatment, such as water washing, heating, *etc.* Trimesoyl chloride (TMC) and *m*-phenylenediamine (MPD) were used to prepare some IniMs through the interfacial polymerization technique on the polysulphone supporting membrane without heat-treatment and washing. Then the *in situ* modification was performed with tetraethylenepentamine (TEPA) on the surface of IniMs. Modified membranes were characterized by using X-ray photoelectronic spectroscopy (XPS), contacting angle and permeation experiments with salt water of different pH values. The results showed that tetraethylenepentamine reacted with acyl chloride (—COCl) on the surface of IniM, because the ratio of O/N of the modified membrane surface was lower than that of unmodified membrane. Furthermore, the contacting angle of modified membrane was larger than that of unmodified membrane. It is interesting that the water flux and rejection of modified membrane decreased with increasing pH value for sodium chloride solution, while the unmodified membrane was just on the contrary. The reason was that functional groups on the modified and unmodified membrane were different, the former were amino (—NH₂) and imino (=NH), and the latter was carboxyl (—COOH).

Key words

[reverse osmosis composite membrane](#) [trimesoyl chloride](#) [initial composite reverse osmosis membrane](#)
[in situ modification](#)

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