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In-situ growth of MoS_2 nanosheets layer on a low-cost flat ceramic substrate for efficient separation of dyes

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Abstract

Molybdenum disulfide (MoS_2), as a promising alternative 2D material, has become an alternative membrane material for water purification thanks to its interlayer nanochannels besides its excellent physicochemical properties [1]. This study presents a facile strategy for in situ-growth of MoS_2 layer on bentonite substrate. An intact MoS_2-based membrane was obtained in a hydrothermal growth process. The structure and properties of the prepared membrane were systematically investigated using scanning electron microscopy (SEM), energy-dispersive X-ray spectroscopy (EDX), X-ray diffraction (XRD), fourier transform infrared spectroscopy (FTIR) and zeta potential measurement. The results indicated that MoS_2 could grow on the surface of bentonite substrate to improve both the permeablity and the selectivity. Due to its sieving effect of the MoS_2 aperture, the prepared MoS_2-based membrane shows high rejection for soluble dyes. Moreover, it exhibits outstanding filtration performances achieving a permeability (30.32 $L{\cdot}m^{-2}h^{-1}bar^{-1}$) and excellent rejection (>94%) for dyes. This approach demonstrated the great potential of MoS_2 membrane for dye separation.

Keywords: MoS_2 membrane; Hydrothermal; bentonite; dye separation.

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References

[1] Y. Liu, Y. Zhao, X. Zhang, X. Huang, W. Liao, Y. Zhao, MoS_2-based membranes in water treatment and purification, Chemical Engineering Journal 422 (2021) 130082. https://doi.org/10.1016/j.cej.2021.130082.