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**Novel mpg-C₃N₄/TiO₂ nanocomposite photocatalytic membrane reactor for
sulfamethoxazole photodegradation**

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Abstract

A novel mesoporous graphitic carbon nitride/titanium dioxide (mpg-C₃N₄/TiO₂) nanocomposite was successfully synthesized and incorporated into polysulfone (PSf) matrix to fabricate photocatalytic membranes. This study aimed to explore the photocatalytic ability of the novel nanomaterial membrane in degrading the antibiotic sulfamethoxazole (SMX) under solar light. The structural and morphological properties of the mpg-C₃N₄/TiO₂ nanocomposite and membrane were characterized using various techniques. The SMX photocatalytic degradation performance, pathway and mechanism by mpg-C₃N₄/TiO₂ photocatalytic membrane reactor (PMR) were systematically investigated using HPLC and LC-MS/MS. As a pharmaceutically active compound, SMX was transformed into 7 kinds of non-toxic and pharmaceutically inactive byproducts by the innovative PMR technology. SMX removal efficiency of the membrane PSf-3 (with 1% mpg-C₃N₄/TiO₂ loading) was the highest over the 30 h consecutive irradiation. Meantime, the membrane didn't affect the SMX photodegradation, and the structure was able to provide stable support with high integrity and flexibility after solar irradiation. The developed membrane has a great potential to be applied

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