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Wen-Da Oh, Li-Wen Lok, Andrei Veksha, Apostolos Giannis, Teik-Thye Lim

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## Enhanced photocatalytic degradation of bisphenol A with Ag-decorated S-doped g-C<sub>3</sub>N<sub>4</sub> under solar irradiation: Performance and mechanistic studies

Wen-Da Oh<sup>a,\*</sup>, Li-Wen Lok<sup>b</sup>, Andrei Veksha<sup>a</sup>, Apostolos Giannis<sup>a</sup>, Teik-Thye Lim<sup>a, b,\*</sup>

<sup>a</sup>Residues and Resource Reclamation Centre (R3C), Nanyang Environment and Water Research Institute, Nanyang Technological University, 1 Cleantech Loop, CleanTech One, Singapore 637141, Singapore

<sup>b</sup>School of Civil and Environmental Engineering, Nanyang Technological University, 50 Nanyang Avenue, Singapore 639798, Singapore

### Abstract:

Ag-decorated S-doped g-C<sub>3</sub>N<sub>4</sub> composites with different % w/w Ag were synthesized *via* chemical reduction method. The Ag/S-doped g-C<sub>3</sub>N<sub>4</sub> composites were used as photocatalysts for aqueous bisphenol A (BPA) degradation under solar irradiation. Investigation of the photocatalysts using various characterization methods including X-ray diffractometry, scanning electron microscopy and transmission electron microscopy indicated that the Ag nanoparticles (average size = 10–20 nm) were well-crystalline and uniformly distributed on the S-doped g-C<sub>3</sub>N<sub>4</sub> (SCN) surface. The photocatalytic performance of SCN was ~3 times more efficient than that of the g-C<sub>3</sub>N<sub>4</sub>, while the Ag/SCN with 12% w/w Ag (Ag-SCN-12) exhibited the highest photocatalytic activity for BPA degradation followed by 8% w/w Ag/SCN, 4% w/w Ag/SCN, SCN, and Ag. The effects of pH and Ag-SCN-12 loading on photocatalytic BPA degradation were also investigated. The results showed that the Ag-SCN-12 was highly stable (<40 µg L<sup>-1</sup> Ag leaching) and could be reused for at least 4 cycles without significant deterioration to its catalytic activity. The incorporation of Ag into the SCN enhanced the photocatalytic activity of SCN due to the improved electron-hole pair separation and decreased electron-hole pair recombination rate as evidenced by the photoluminescence emission study. The predominant reactive oxygen species (ROS) generated by the Ag-SCN-12 photocatalytic system was O<sub>2</sub><sup>•-</sup> which formed secondary ROS

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