

Carbon dots as an electron extractant for enhanced photocatalytic antibacterial activity of covalent organic frameworks

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The covalent organic framework@carbon dot (COF@CD) composite was successfully constructed to achieve high-flux charge transfer and efficient photocatalytic activity for antibacterial photocatalytic therapy. Utilizing the establishment of intramolecular charge transfer between donor–acceptor (D–A) semiconductors and polymers with CO–H–N hydrogen-bonding groups, the charge transfer channel constructed by using a D–A COF semiconductor and hydrophilic CDs was built. This is the first report on hydrogen-bonded two-dimensional COF-zero-dimensional CDs for artificial antibacterial photosynthesis. These CDs uniformly distributed on the surface of COF nanosheets play an important role in inhibiting charge recombination as both electron transfer and storage containers. The introduction of CDs greatly enhanced the charge separation efficiency by extracting abundant photogenerated π -electrons from the COF, resulting in the generation of more reactive oxygen species. COF@CDs (4 wt% CDs) present photocatalytic antibacterial activity with sterilization efficiency of over 95% in 1 h under visible light irradiation, with a decrease in the survival rate by 8.3 times compared to that of the COF.



Short Bio:

Bingfu Lei is currently a professor at the College of Materials and Energy, South China Agricultural University. He obtained his PhD degree in 2007 in condensed matter physics from Changchun Institute of Optics Fine Mechanics and Physics, Chinese Academy of Sciences. His research focuses on luminescent materials synthesis and the application of luminescent materials in agriculture and display.