



## Photocatalysis

### 1- Organic thermally activated delayed fluorescence (TADF) compounds used in photocatalysis

By:

[Bryden, MA](#) (Bryden, Megan Amy) [\[1\]](#); [Zysman-Colman, E](#) (Zysman-Colman, Eli) [\[1\]](#)

(provided by Clarivate)

**Volume**

50

**Issue**

13

**Page**

7587-7680

**DOI**

10.1039/d1cs00198a

**Published**

JUL 7 2021

**Early Access**

MAY 2021

**Indexed**

2021-06-05

**Document Type**

Review

**Abstract**

Organic compounds that show Thermally Activated Delayed Fluorescence (TADF) have become wildly popular as next-generation emitters in organic light emitting diodes (OLEDs). Since 2016, a subset of these have found increasing use as photocatalysts. This review comprehensively highlights their potential by documenting the diversity of the reactions where an organic TADF photocatalyst can be used in lieu of a noble metal complex photocatalyst. Beyond the small number of TADF photocatalysts that have been used to date, the analysis conducted within this review reveals the wider potential of organic donor-acceptor TADF compounds as photocatalysts. A discussion of the benefits of compounds showing TADF for photocatalysis is presented, which paints a picture of a very promising future for organic photocatalyst development.

**Keywords**

**Keywords Plus**

[DISTANCE ELECTRON-TRANSFERLIGHT-EMITTING-DIODESC-H BONDS](#)[DONOR-ACCEPTOR MOLECULESHIGH TRIPLET ENERGYVISIBLE-LIGHTPHOTOREDOX CATALYSISATOM-TRANSFERROSE-BENGALTRANSITION-METAL](#)



## Photocatalysis

### 2- Perovskite Oxide Based Materials for Energy and Environment-Oriented Photocatalysis

**By:**

[Kumar, A](#) (Kumar, Ashish) [\[1\]](#), [\[2\]](#); [Kumar, A](#) (Kumar, Ajay) [\[1\]](#), [\[2\]](#); [Krishnan, V](#) (Krishnan, Venkata) [\[1\]](#), [\[2\]](#)

(provided by Clarivate)

**Volume**

10

**Issue**

17

**Page**

10253-10315

**DOI**

10.1021/acscatal.0c02947

**Published**

SEP 4 2020

**Indexed**

2020-09-29

**Document Type**

Review

**Abstract**

The use of solar energy to catalyze the photo-driven processes has attracted tremendous attention from the scientific community because of its great potential to address energy and environmental issues. In this regard, several attempts have been made by researchers to design and develop different materials with enhanced photocatalytic efficiencies. This Review comprehensively summarizes the recent reports on perovskite oxide based photocatalysts for organic pollutant degradation, water splitting, carbon dioxide conversion, and nitrogen fixation along with the basic understanding of involved mechanisms, current trends and advances in the field. The different design, synthesis, and development strategies have been discussed in detail to provide a comprehensive view of materials' fabrication that influences their photocatalytic properties. Subsequently, the insights from recent reports on different perovskite oxide based materials, including simple oxides, mixed oxides, and layered perovskite oxides, are provided for the above-mentioned photocatalytic applications in a detailed manner. Finally, a summary of photocatalytic applications and a perspective on future research direction have been discussed. Based on the research progress in this field, it is highly anticipated that the photocatalytic systems, comprising perovskite oxide materials along with groundbreaking technologies for large-scale realization of these processes, can be established in the near future to address the energy and environment-oriented challenges.

**Keywords**

**Author Keywords**



## Photocatalysis

[Perovskite oxides](#)[pollutants degradation](#)[water splitting](#)[carbon dioxide conversion](#)[nitrogen fixation](#)

### Keywords Plus

[P-N HETEROJUNCTION](#)[VISIBLE-LIGHT IRRADIATION](#)[WATER-SPLITTING ACTIVITY](#)[ASSISTED HYDROTHERMAL SYNTHESIS](#)[ORGANIC POLLUTANTS DEGRADATION](#)[SOLUTION COMBUSTION SYNTHESIS](#)[DOPED SrTiO<sub>3</sub> PHOTOCATALYSTS](#)[SOLAR HYDROGEN-PRODUCTION](#)[SURFACE OXYGEN VACANCIES](#)[SELECTIVE CO<sub>2</sub> REDUCTION](#)



## Photocatalysis

### 3- A transparent superhydrophobic coating with mechanochemical robustness for anti-icing, photocatalysis and self-cleaning

By:

[Zhu, TX](#) (Zhu, Tianxue) [1]; [Cheng, Y](#) (Cheng, Yan) [1]; [Huang, JY](#) (Huang, Jianying) [2]; [Xiong, JQ](#) (Xiong, Jiaqing) [3]; [Ge, M](#) (Ge, Mingzheng) [4]; [Mao, JJ](#) (Mao, Jiajun) [2]; [Liu, Z](#) (Liu, Zekun) [5]; [Dong, XL](#) (Dong, Xiuli) [1]; [Chen, Z](#) (Chen, Zhong) [3]; [Lai, YK](#) (Lai, Yuekun) [2]

(provided by Clarivate)

**Volume**

399

**Article Number**

125746

**DOI**

10.1016/j.cej.2020.125746

**Published**

NOV 1 2020

**Indexed**

2020-09-04

**Document Type**

Article

**Abstract**

Transparent and conformal superhydrophobic coating with mechanochemical robustness is of great importance for various applications, such as waterproof, self-cleaning, and anti-icing for windows of cars and buildings. However, it remains a daunting challenge to endow the functional surface with programmable wettability. Herein, we propose a hierarchical coating consisting of polydimethylsiloxane (PDMS) nanoparticles (NPs) and PDMS microparticles (MPs) functional NPs through a combination of thermal treatment and spray treatment. The evaporation of PDMS under heat treatment is firstly applied to form a uniform nanoarchitectures, followed by spraying a mixed P25-PDMS dispersion to construct a protective coating with enhanced surface roughness. This resulted coating is conformal and possess reversible wettability on various substrates. In virtue of the light response property of P25, the reversible wettability between superhydrophobicity and hydrophobicity can be achieved by repetitive UV-light irradiation and dark environment storage. Besides, the coating can maintain superhydrophobicity with high transmittance (76% optical transmittance) after immersion in acid/base solution for 24 h and continuously sand impingement. Furthermore, the coating exhibits mechanochemical robustness against high speed water jet and Elcometer 99 tape peeling test for 30 cycles due to the high adhesion between the robust coating and the glass. For practical application, the coating was demonstrated to have excellent performance in anti-icing, photocatalytic degradation of pollutants and self-cleaning.

**Keywords**

**Author Keywords**



## Photocatalysis

[Superhydrophobic glass](#)[Mechanical robustness](#)[PDMS nanoparticles](#)[Anti-icing](#)[Self-cleaning](#)

### **Keywords Plus**

[SURFACES](#)[WETTABILITY](#)[FABRICATION](#)[FILMS](#)[DROPLETS](#)[SPRAY](#)[GLASS](#)[AIR](#)



## Photocatalysis

### 4- Simultaneous removal of antibiotics and inactivation of antibiotic-resistant bacteria by photocatalysis: A review

By:

[Baaloudj, O](#) (Baaloudj, Oussama) [1]; [Assadi, I](#) (Assadi, Imen) [2]; [Nasrallah, N](#) (Nasrallah, Nouredine) [1]; [El Jery, A](#) (El Jery, Atef) [3], [4]; [Khezami, L](#) (Khezami, Lotfi) [5], [6]; [Assadi, AA](#) (Assadi, Aymen Amin) [7]

(provided by Clarivate)

**Volume**

42

**Article Number**

102089

**DOI**

10.1016/j.jwpe.2021.102089

**Published**

AUG 2021

**Indexed**

2021-09-01

**Document Type**

Review

**Abstract**

To deal with the contamination of the water environment, which represents an arena for microorganisms and antibiotics, a photocatalytic process has been proposed due to its high efficiency and non-toxicity. This review discusses and investigates antibiotics and antibiotic-resistant bacteria (ARB) removal and inactivation with their associated genes through photocatalysis technique as an efficient and ecofriendly advanced oxidation process (AOP) photocatalysis. The paper summarizes recent studies that dealt with both pollutants and their process parameters, optimal operating conditions, used semiconductor photocatalysts and their corresponding removal efficiency. Thus, it suggests that photocatalysis can offer impressive treatment efficiencies for both organic and microbial pollutants simultaneously. The review also states that both antibiotics and bacteria have a destroying effect against each other, where antibiotics have antimicrobial activity and bacteria have microbial degradation. This phenomenon creates a hybrid system for each pollutant (photocatalysis-bacteria, photocatalysis-antibiotic, bacteria-antibiotic), which accelerates the purification and disinfection of the polluted water caused by pathogens and hazardous pollutants using green and safe technology. Moreover, the reaction mechanism was detailed in order to define the role of reactive oxygen species (ROS). Likewise, photocatalysis coupling with other AOP techniques in this context was discussed to achieve more promising results. The main contribution of this review is to explain the relationship between antibiotics, microbial contaminants and photocatalysis. It also introduces a new area of study and concludes with an outlook on future research topics, such as viral disinfection.



## Photocatalysis

### Keywords

### Author Keywords

[Photocatalysis](#)[Disinfection](#)[Antibiotics](#)[Antibiotic-resistant bacteria](#)[Wastewater](#)

### Keywords Plus

[WASTE-WATER TREATMENT](#)[N-DOPED TiO<sub>2</sub>](#)[VISIBLE-LIGHT](#)[STAPHYLOCOCCUS-AUREUS](#)[AQUATIC ENVIRONMENT](#)[ESCHERICHIA-COLIA](#)[AQUEOUS-SOLUTION](#)[ADVANCED OXIDATION](#)[DEGRADATION](#)[DISINFECTION](#)



## Photocatalysis

### 5- A review of metal organic framework (MOFs)-based materials for antibiotics removal via adsorption and photocatalysis

**By:**

[Du, CY](#) (Du, Chunyan) [1], [2]; [Zhang, Z](#) (Zhang, Zhuo) [1]; [Yu, GL](#) (Yu, Guanlong) [1], [2]; [Wu, HP](#) (Wu, Haipeng) [1], [2]; [Chen, H](#) (Chen, Hong) [1], [2]; [Zhou, L](#) (Zhou, Lu) [1], [2]; [Zhang, Y](#) (Zhang, Yin) [1]; [Su, YH](#) (Su, Yihai) [1]; [Tan, SY](#) (Tan, Shiyang) [1]; [Yang, L](#) (Yang, Lu) [1];

(provided by Clarivate)

**Volume**

272

**Article Number**

129501

**DOI**

10.1016/j.chemosphere.2020.129501

**Published**

JUN 2021

**Early Access**

JAN 2021

**Indexed**

2021-05-13

**Document Type**

Review

**Abstract**

Antibiotic abuse has led to serious water pollution and severe harm to human health; therefore, there is an urgent need for antibiotic removal from water sources. Adsorption and photodegradation are two ideal water treatment methods because they are cheap, simple to operate, and reusable. Metal organic frameworks (MOFs) are excellent adsorbents and photocatalysts because of their high porosity, adaptability, and good crystal form. The aim of this study is to suggest ways to overcome the limitations of adsorption and photocatalysis treatment methods by reviewing previous applications of MOFs to antibiotic adsorption and photocatalysis. The different factors influencing these processes are also discussed, as well as the various adsorption and photocatalysis mechanisms. This study provides a valuable resource for researchers intending to use MOFs to remove antibiotics from water bodies. (C) 2021 Elsevier Ltd. All rights reserved.

**Keywords**

**Author Keywords**

[Adsorbent](#)[Antibiotics](#)[Metal organic frameworks \(MOFs\)](#)[Photodegradation](#)

**Keywords Plus**





## Photocatalysis

ADVANCED OXIDATION PROCESSES  
PH-RESPONSIVE RELEASE  
ONE-STEP SYNTHESIS  
EFFICIENT REMOVAL  
FLUOROQUINOLONE ANTIBIOTICS  
NITROIMIDAZOLE ANTIBIOTICS  
MIL-101(Fe)/TiO<sub>2</sub>  
COMPOSITE  
RECYCLABLE ADSORBENT  
NANOPOROUS CARBON  
AQUEOUS-SOLUTION



## Photocatalysis

### 6- Modulating Coordination Environment of Single-Atom Catalysts and Their Proximity to Photosensitive Units for Boosting MOF Photocatalysis

By:

[Ma, X](#) (Ma, Xing) [1]; [Liu, H](#) (Liu, Hang) [1]; [Yang, WJ](#) (Yang, Weijie) [2]; [Mao, GY](#) (Mao, Guangyang) [2]; [Zheng, LR](#) (Zheng, Lirong) [3]; [Jiang, HL](#) (Jiang, Hai-Long) [1]

(provided by Clarivate)

**Volume**

143

**Issue**

31

**Page**

12220-12229

**DOI**

10.1021/jacs.1c05032

**Published**

AUG 11 2021

**Early Access**

JUL 2021

**Indexed**

2021-08-19

**Document Type**

Article

**Abstract**

Well-organized photosensitive units and catalytic sites in proximity are crucial for improving charge separation efficiency and boosting photocatalysis. Herein, a general and facile strategy for the construction of high-loading (>4 wt %) single-atom catalysts (SACs) with a tunable coordination microenvironment has been developed on the basis of metal-organic frameworks (MOFs). The neighboring -O/OHx groups from a Zr-6-oxo cluster in the MOFs provide lone-pair electrons and charge balance to immobilize the extraneous single metal atoms. The well-accessible and atomically dispersed metal sites possess close proximity to the photosensitive units (i.e., linkers), which greatly accelerates charge transfer and thereby promotes the redox reaction. The coordination environment of the representative single-atom Ni sites significantly modulates the electronic state and the proton activation barrier toward hydrogen production. As a result, the optimized Ni-1-S/MOF with a unique Ni(I) microenvironment presents excellent photocatalytic H<sub>2</sub> production activity, up to 270 fold of the pristine MOF and far surpassing the other Ni-1-X/MOF counterparts. This work unambiguously demonstrates the great advantage of MOFs in the fabrication of high-content SACs with variable microenvironments that are in close proximity to photosensitive linkers, thereby facilitating the electron transfer and promoting photocatalysis.



## Photocatalysis

### Keywords

### Keywords Plus

[METAL-ORGANIC FRAMEWORKS](#) [HYDROGEN EVOLUTION](#) [ADSORPTION](#) [CHEMISTRY](#) [OXIDATION](#) [EPR](#)



## Photocatalysis

### 7- Applications of Halogen-Atom Transfer (XAT) for the Generation of Carbon Radicals in Synthetic Photochemistry and Photocatalysis

By:

[Julia, F](#) (Julia, Fabio) [1]; [Constantin, T](#) (Constantin, Timothee) [1]; [Leonori, D](#) (Leonori, Daniele) [1]  
(provided by Clarivate)

**Volume**

122

**Issue**

2

**Page**

2292-2352

**DOI**

10.1021/acs.chemrev.1c00558

**Published**

JAN 26 2022

**Indexed**

2022-04-06

**Document Type**

Review

**Abstract**

The halogen-atom transfer (XAT) is one of the most important and applied processes for the generation of carbon radicals in synthetic chemistry. In this review, we summarize and highlight the most important aspects associated with XAT and the impact it has had on photochemistry and photocatalysis. The organization of the material starts with the analysis of the most important mechanistic aspects and then follows a subdivision based on the nature of the reagents used in the halogen abstraction. This review aims to provide a general overview of the fundamental concepts and main agents involved in XAT processes with the objective of offering a tool to understand and facilitate the development of new synthetic radical strategies.

**Keywords**

**Keywords Plus**

[ABSOLUTE RATE CONSTANT](#)[TRANSFER CYCLIZATION REACTION](#)[ELECTRON-SPIN-RESONANCE](#)[LASER FLASH-PHOTOLYSIS](#)[ALPHA-IODO ESTERS](#)[BOND-DISSOCIATION ENERGIES](#)[TRANSITION-METAL-COMPLEXES](#)[CROSS-COUPLING REACTIONS](#)[CHIRAL N-ACYLHYDRAZONES](#)[TRIPLET EXCITED-STATE](#)



## Photocatalysis

### 8- In-situ self-assembly construction of hollow tubular g-C<sub>3</sub>N<sub>4</sub> isotype heterojunction for enhanced visible-light photocatalysis: Experiments and theories

By:

[Liang, QH](#) (Liang, Qinghua) [1], [2]; [Liu, XJ](#) (Liu, Xiaojuan) [3]; [Wang, JJ](#) (Wang, Jiajia) [1], [2]; [Liu, Y](#) (Liu, Yang) [1], [2]; [Liu, ZF](#) (Liu, Zhifeng) [1], [2]; [Tang, L](#) (Tang, Lin) [1], [2]; [Shao, BB](#) (Shao, Binbin) [1], [2]; [Zhang, W](#) (Zhang, Wei) [3]; [Gong, SX](#) (Gong, Shanxi) [4]; [Cheng, M](#) (Cheng, Min) [1], [2];

(provided by Clarivate)

**Volume**

401

**Article Number**

123355

**DOI**

10.1016/j.jhazmat.2020.123355

**Published**

JAN 5 2021

**Indexed**

2021-02-03

**Document Type**

Article

**Abstract**

A highly reactive hollow tubular g-C<sub>3</sub>N<sub>4</sub> isotype heterojunction (SCN-CN) was designed to enhance visible light absorption and manipulate the directed transfer of electrons and holes. The results of UV-vis DRS, XPS valence band and DFT theoretical calculations indicated S doping increases the visible-light absorption capacity and changed the band gap structure of g-C<sub>3</sub>N<sub>4</sub> (CN), resulting in the transfer of electrons from the CN to the SCN and holes from the SCN to the CN under visible light. In addition, the tubular structure of the SCN-CN facilitated the transfer of electrons in the longitudinal direction, which reduced charge carrier recombination. Furthermore, the optical properties, electronic structure, and electron transfer of SCN-CN were also studied by experiments and theoretical calculations. The antibiotic tetracycline hydrochloride (TCH) and dye Rhodamine B (RHB) were subjected to evaluate the photocatalytic performance of SCN-CN. The scavenger tests and ESR data showed that the h(+), center dot O-2(-) and center dot OH worked together in the photocatalytic process. Moreover, the photocatalytic degradation pathway was analyzed by LC-MS. This study synthesized a hollow tubular CN isotype heterojunction with high visible-light photocatalytic performance and provided a theoretical basis for CN isotype heterojunction.

Graphical abstract

**Keywords**

**Author Keywords**



## Photocatalysis

[g-C<sub>3</sub>N<sub>4</sub> isotype heterojunction Self-assembly Visible-light photocatalysis Theoretical calculation Degradation pathway](#)

### Keywords Plus

[Z-SCHEME PHOTOCATALYST DOPED CARBON NITRIDE ELECTRONIC-STRUCTURE FACILE FABRICATION HYDROGEN EVOLUTION MOLECULAR DOCKING PERFORMANCE NANOSHEETS REMOVAL DEGRADATION](#)



## Photocatalysis

### 9- One-pot thermal polymerization route to prepare N-deficient modified g-C<sub>3</sub>N<sub>4</sub> for the degradation of tetracycline by the synergistic effect of photocatalysis and persulfate-based advanced oxidation process

By:

[Sun, HR](#) (Sun, Haoran) [1]; [Guo, F](#) (Guo, Feng) [1]; [Pan, JJ](#) (Pan, Jingjing) [1]; [Huang, W](#) (Huang, Wei) [3]; [Wang, K](#) (Wang, Kai) [1]; [Shi, WL](#) (Shi, Weilong) [2]

(provided by Clarivate)

**Volume**

406

**Article Number**

126844

**DOI**

10.1016/j.cej.2020.126844

**Published**

FEB 15 2021

**Indexed**

2021-01-18

**Document Type**

Article

**Abstract**

N-deficient g-C<sub>3</sub>N<sub>4</sub> (CN<sub>x</sub>) photocatalyst was synthesized via a simple one-step thermal polymerization of urea and oxamide for the degradation of tetracycline (TC) under visible-light irradiation in the presence of persulfate (PS) activation. The microstructure and morphology of CN<sub>x</sub> were investigated by a host of characteristic technologies. The experimental result revealed that CN<sub>x</sub>/PS system displays a high efficiency in the photocatalytic process of TC degradation. The effects of different environmental factors (catalyst dose, PS dose, initial TC concentration and initial pH) on the degradation of the system were investigated. The possible intermediates products were discussed based on the liquid chromatography-mass spectrometry (LC-MS) analysis. Moreover, the toxicity of the TC solution over CN<sub>x</sub>/PS synergistic photocatalytic system was studied by the culture of bean sprouts, demonstrated that the aquatic toxicity of the TC after degradation of the system was effectively reduced.

**Keywords**

**Author Keywords**

[N-deficient g-C<sub>3</sub>N<sub>4</sub>](#)[Persulfate activation](#)[Visible-light](#)[Photocatalysis](#)[Advanced oxidation process](#)[Tetracycline](#)

**Keywords Plus**

[GRAPHITIC CARBON NITRIDE](#)[NITROGEN DEFECTS](#)[PEROXYMONOSULFATE](#)[PMS](#)[HYDROGEN EVOLUTION](#)[POROUS G-C<sub>3</sub>N<sub>4</sub>](#)[HETEROJUNCTION](#)[WATERACTIVATION](#)[KINETICS](#)[SDOTS](#)