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Editorial: Micro-nano optics and photocatalysis: materials, devices, and applications-volume II

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Editorial on the Research Topic
Micro-nano optics and photocatalysis: materials, devices, and applications-volume II

Micro-nano optics and photocatalytic technology has had a great impact on the development of modern devices and the application of environmental purification technology. These technologies have been applied in the fields of information storage, biosensing, display devices, light emitting devices, optical communication devices, electronic devices and magnetic sensors. In particular, the application of these technologies in the aerospace field has been favored by researchers, such as the development of a new Hall thruster as a plasma optical device and its application in space thrusters, and the use of molecular dynamics software to calculate the degradation of atomic oxygen on the surface of the spacecraft and polymer materials, which affects the life of the spacecraft. Through the surface plasmon resonance effect of noble metals including Au, Ag or other metals, many excellent optical devices, especially biosensors, can be designed for the detection of glucose. It is worth noting that the problem of photocatalysis technology is still to find excellent photocatalysts to efficiently degrade pollutants (Wang et al., 2023). The construction of heterojunction has become a key technical means to solve the problem of photocatalyst synthesis in the current environmental purification technology.

In this volume, the Particle-in-cell model is used to simulate the design of a 5 kW Hall thruster that will be used for space propulsion. Simultaneously, the influence of magnetic field on the performance of Hall thrusters is studied. There is a large amount of atomic oxygen in low Earth orbit, and these atomic oxygen will cause great corrosion to the spacecraft surface and affect the life of the spacecraft. The life of a spacecraft can be effectively simulated by using molecular dynamics model on the impact of atomic oxygen on the polymer material on the spacecraft surface. Temperature change, mass loss, reaction products and erosion depth have great effects on the surface of spacecraft. The study of these parameters can provide technical reference for aerospace applications. Upilex-S does have lower mass loss and erosion yield than Kapton

under the same atomic oxygen, further confirming the potential application of Upilex-S in the field of spacecraft.

The multi-layered Kretschmann configuration-based Surface Plasmon Resonance (SPR) biosensor have been developed to detect the urine glucose. SPR effect has an excellent application prospect in optical fiber sensor, biosensor and photocatalyst. Different 2-D nanomaterials (graphene, BP) and TMDC materials (MoS_2, $MoSe_2$, WS_2, and WSe_2) have been explored to design a plasmonic biosensor. In addition, a type II band aligned $BaTiO_3/CeO_2$ photocatalyst was constructed by one-step solution synthesis method to degrade different drugs, such as oxytetracycin hydrochloride (OH), aureomycin hydrochloride (AH), Oxytetracycin hydrochloride (OH), Aureomycin hydrochloride (AH). doxycycline hydrochloride (DH), or tetracycline hydrochloride (TH) showed excellent photocatalytic activity. The effects of different environmental parameters including catalyst content, initial concentration and pH on photocatalytic activity were investigated. This synthesis strategy provides a new idea for the construction of wideband gap semiconductor heterojunction.

Author contributions

SW: Writing–original draft, Writing–review and editing. HY: Writing–review and editing. TX: Writing–review and editing. SW: Writing–review and editing. ZY: Writing–review and editing.

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Conflict of interest

The authors declare that the research was conducted in the absence of any commercial or financial relationships that could be construed as a potential conflict of interest.

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