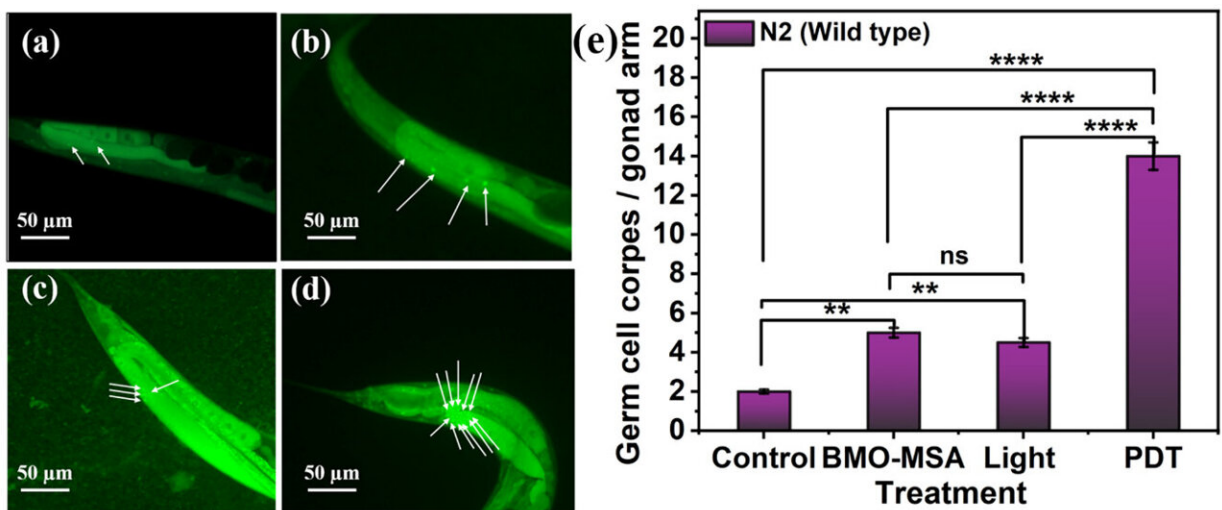


Nanocomposite developed for NIR-II light-boosted photodynamic/chemodynamic therapy

June 7 2023, by Zhao Weiwei, Shereen M. Elsherbiny



Representative images of germline apoptosis in N2 induced by (a) control, (b) BMO-MSA, (c) light, and (d) PDT. The apoptotic cells are indicated by white arrows. (e) The germ cell corpses in the N2 gonad were induced by BMO-MSA, light, and PDT with control. Credit: Shereen M. Elsherbiny

Recently, a research team led by Prof. Huang Qing at the Institute of Intelligent Machines, Hefei Institutes of Physical Science (HFIPS) provided a new nanocomposite based on $\text{Bi}_2\text{MoO}_6/\text{MoS}_2/\text{AuNRs}$ for near-infrared (NIR)-II light-boosted photodynamic/chemodynamic therapy.

The results have been published in *Langmuir*.

Bi_2MoO_6 (BMO) nanoparticles (NPs) have been extensively used in photocatalytic applications and utilized as a photosensitizer in photodynamic [therapy](#). However, their UV absorption property hinders their [clinical application](#).

In this research, scientists designed a new nanocomposite named $\text{Bi}_2\text{MoO}_6/\text{MoS}_2/\text{AuNRs}$ (BMO-MSA). They found that the resulting nanocomposite can absorb light in the NIR-II range. The outcomes of the research revealed that after exposure to light with wavelength 1064 nm, the BMO-MSA produced [singlet oxygen](#) ($^1\text{O}_2$) with a quantum yield of 0.32, which confirmed its [photodynamic therapy](#) (PDT) ability. Moreover, it has POD-like activity, which enhances the chemodynamic therapy (CDT) effect.

To investigate the in vivo PDT efficiency of BMO-MSA, the researcher studied the germline apoptosis based on their previously *C. elegans*-established PDT model. The findings demonstrated that PDT caused germline apoptosis in the worm through the cep-1 pathway due to DNA damage. This finding was further supported by the utilization of a variety of mutants that had a lack of function related to DNA damaged genes.

This work has not only provided a novel PDT agent which may be used for PDT in the NIR-II region but also introduced a new approach to therapy taking advantage of both PDT and CDT effects, according to the team.

More information: Qilin Yang et al, Deterioration Effects of Oxidative Aging on Graphene-Asphalt Nanocomposite Interfaces: Multiscale Modeling, *Langmuir* (2023). [DOI: 10.1021/acs.langmuir.3c00917](#)

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