
Scientists Propose Potential Method for Imaging-Guided Synergistic Cancer Therapy

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A joint research team led by Prof. WANG Hui and Prof. LIN Wenchu from the High Magnetic Field Laboratory of the Hefei Institutes of Physical Science developed a synthesis of metal-free multifunctional therapeutic reagents, called graphitic carbon nitride quantum dots embedded in carbon nanosheets (CNQD-CN), via a one-step hydrothermal treatment.

Metal-free multifunctional nanomaterials have broad application prospects in integrated cancer diagnosis and treatment. The team took an organic solvent (formamide) as the carbon and nitrogen source and then developed CNQD-CN.

CNQD-CN can be utilized as a near-infrared (NIR)/pH dual-responsive drug delivery system to improve the response to chemotherapy. It possesses both light-to-heat conversion and singlet oxygen generation capabilities under a single NIR excitation wavelength for combined photodynamic and photothermal therapy.

"The combination of graphitic carbon nitride quantum dots and two-dimensional carbon-based nanomaterials might be a potential candidate for realizing imaging-guided synergistic cancer therapy due to its excellent performance, including optical properties, efficient light-to-heat conversion capability, and near-infrared (NIR)-induced singlet oxygen generation," said WANG Hui, who designed the project.

However, synthesis of related nanocomposites, including multiple reaction precursors, complex synthesis processes, potential weak interaction, produced large amounts of waste, thus limiting their scalable production and reproducibility.

This [study](#) was a further step in realizing the advantages of imaging-guided synergistic

cancer therapy.



Graphic of CNQD-CN for NIR imaging and combined chemotherapy and phototherapy to treat cancer.

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