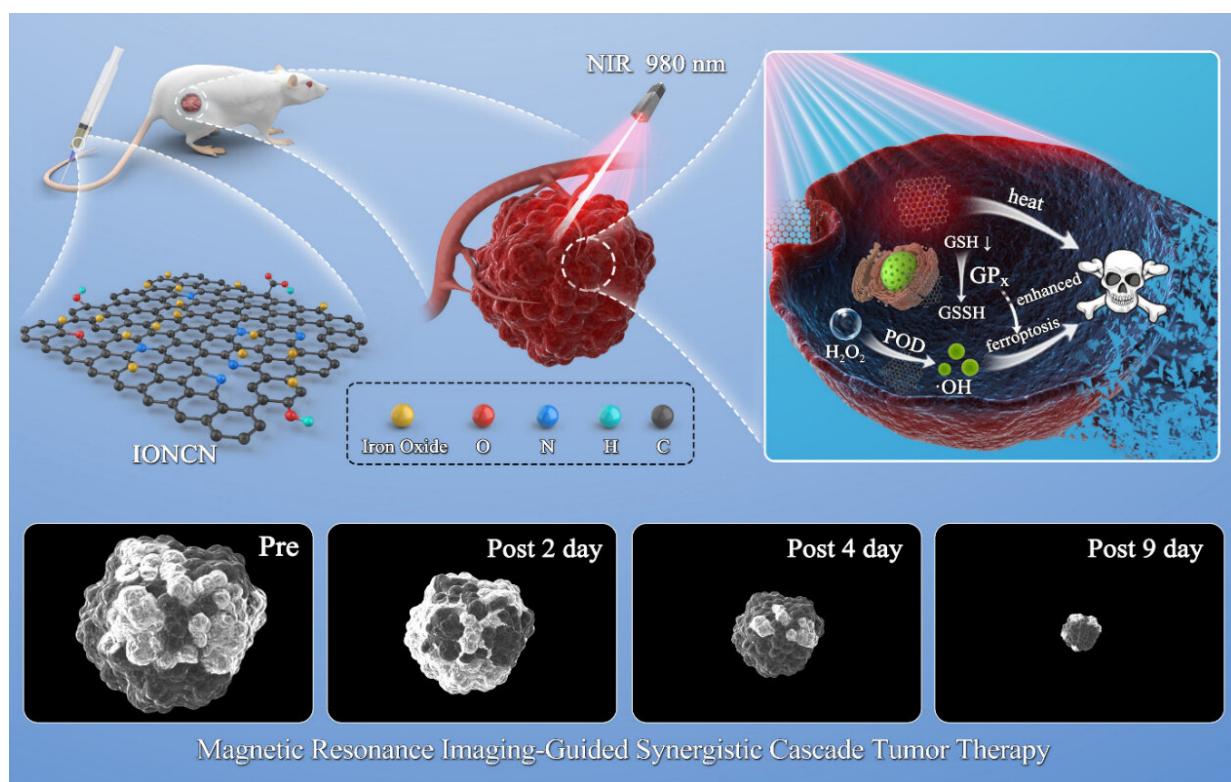


Near-infrared-triggered nanozyme for synergistic cascade tumor therapy

August 30 2022, by Li Yuan



NIR-triggered nanozyme for real-time MRI-guided combined tumor therapy.
Credit: LIU Hongji

A joint research team led by Prof. Wang Hui, Prof. Zhang Xin and Prof. Qian Junchao from the Hefei Institutes of Physical Science (HFIPS) of the Chinese Academy of Sciences (CAS) has proposed a new kind of

near-infrared-triggered nanozyme based on iron oxide nanocrystals embedded in N-doped carbon nanosheets (IONCNs), which is promising for synergistic cascade tumor therapy.

The study was published in *ACS Applied Materials & Interfaces*.

Chemodynamic therapy is an efficient cancer treatment method determined by the striking difference between the tumor microenvironments and normal tissues. By triggering the Fenton or Fenton-like reaction, it can generate highly toxic hydroxyl radical ($\cdot\text{OH}$) to kill [tumor cells](#).

Unfortunately, the overexpression of glutathione in tumor microenvironments limits the therapeutic efficacy by counteracting $\cdot\text{OH}$ generation. Moreover, the [normal cells](#) or [inflammatory cells](#) are easily affected simultaneously owing to their similar characteristics to the tumor microenvironments. Therefore, it is necessary to develop an exogenous triggered nanozyme to realize tumor-specific catalytic therapy.

In this study, the researchers used a one-step hydrothermal method to synthesize IONCNs.

The as-prepared IONCNs could absorb and convert 980 nm light to local heat that not only killed cancer cell by photothermal therapy but also induced the dissolution of [iron oxide](#) to produce $\text{Fe}^{2+}/\text{Fe}^{3+}$ in a weak acid solution.

The formed Fe^{2+} catalyzed the decomposition of hydrogen peroxide to generate hydroxyl radical for chemodynamic therapy. The formed Fe^{3+} acted as a glutathione peroxidase to amplify the oxidative stress of cancer cells and therapeutic effect of chemodynamic therapy.

Additionally, the IONCNs could be used as a [magnetic resonance](#) imaging contrast agent to visually monitor the treatment process of cancer.

More information: Hongji Liu et al, Exogenously Triggered Nanozyme for Real-Time Magnetic Resonance Imaging-Guided Synergistic Cascade Tumor Therapy, *ACS Applied Materials & Interfaces* (2022). [DOI: 10.1021/acsami.2c07375](https://doi.org/10.1021/acsami.2c07375)

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