

ROS-scavenging nanozymes for anti-inflammation therapeutics

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The dysregulation of reactive oxygen species (ROS) is linked to inflammatory diseases including rheumatoid arthritis, cardiovascular disease and cancer. Live organisms have therefore evolved a number of highly efficient anti-inflammation enzymes with ROS-scavenging capabilities to protect tissues from inflammation-induced damage. However, the natural ROS-scavenging enzymes are sensitive to environmental conditions and are hard to mass produce. To address these challenges, numerous artificial enzymes with ROS-scavenging capabilities have been developed. Among them, ROS-scavenging nanozymes have recently attracted great interest owing to their enhanced stability, multi-functionality and tunable activity.

Nanozymes are catalytic nanomaterials with [enzyme](#)-mimicking activities. Several nanomaterials have been explored to develop ROS-scavenging nanozymes. For example, ceria nanoparticles (CeO₂ NPs) have been demonstrated to possess superoxide dismutase (SOD)-mimicking activities due to the mixed valance states of Ce₃₊ and Ce₄₊. Biological studies have revealed that natural Mn SOD is superior to Cu/Zn SOD and Fe SOD, which implies that Mn-based nanozymes may have enhanced ROS-scavenging activities compared with known examples. Despite great promise, only a few Mn-based nanozymes have been reported. Moreover, they have not been used for in vivo anti-inflammation yet.

To tackle these challenges, Professor Wei at Nanjing University and his co-workers have now fabricated Mn₃O₄ NPs with multiple enzyme mimicking activities. The Mn₃O₄ nanozymes possessed SOD- and catalase-like activities as well as hydroxyl radical scavenging [activity](#). Therefore, they scavenged the superoxide radical as well as hydrogen peroxide and the hydroxyl radical. Wei et al. also demonstrated that the Mn₃O₄ nanozymes were superior to CeO₂

nanozymes in term of the ROS-scavenging activities. Moreover, they showed that the Mn₃O₄ nanozymes not only exhibited excellent ROS removal efficacy in vitro, but also effectively protected live mice from ROS-induced ear inflammation in vivo.

Their studies provided not only a highly efficient ROS-scavenging nanozyme, but also a promising therapeutic strategy for treating inflammation-related diseases.

More information: [10.1039/c7sc05476a](https://doi.org/10.1039/c7sc05476a) Jia Yao et al. ROS scavenging Mn₃O₄ nanozymes for in vivo anti-inflammation, *Chemical Science* (2018). [DOI: 10.1039/C7SC05476A](https://doi.org/10.1039/C7SC05476A)

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