Defect-rich MnOx nanobelts prepared for glutathione detection in recent study

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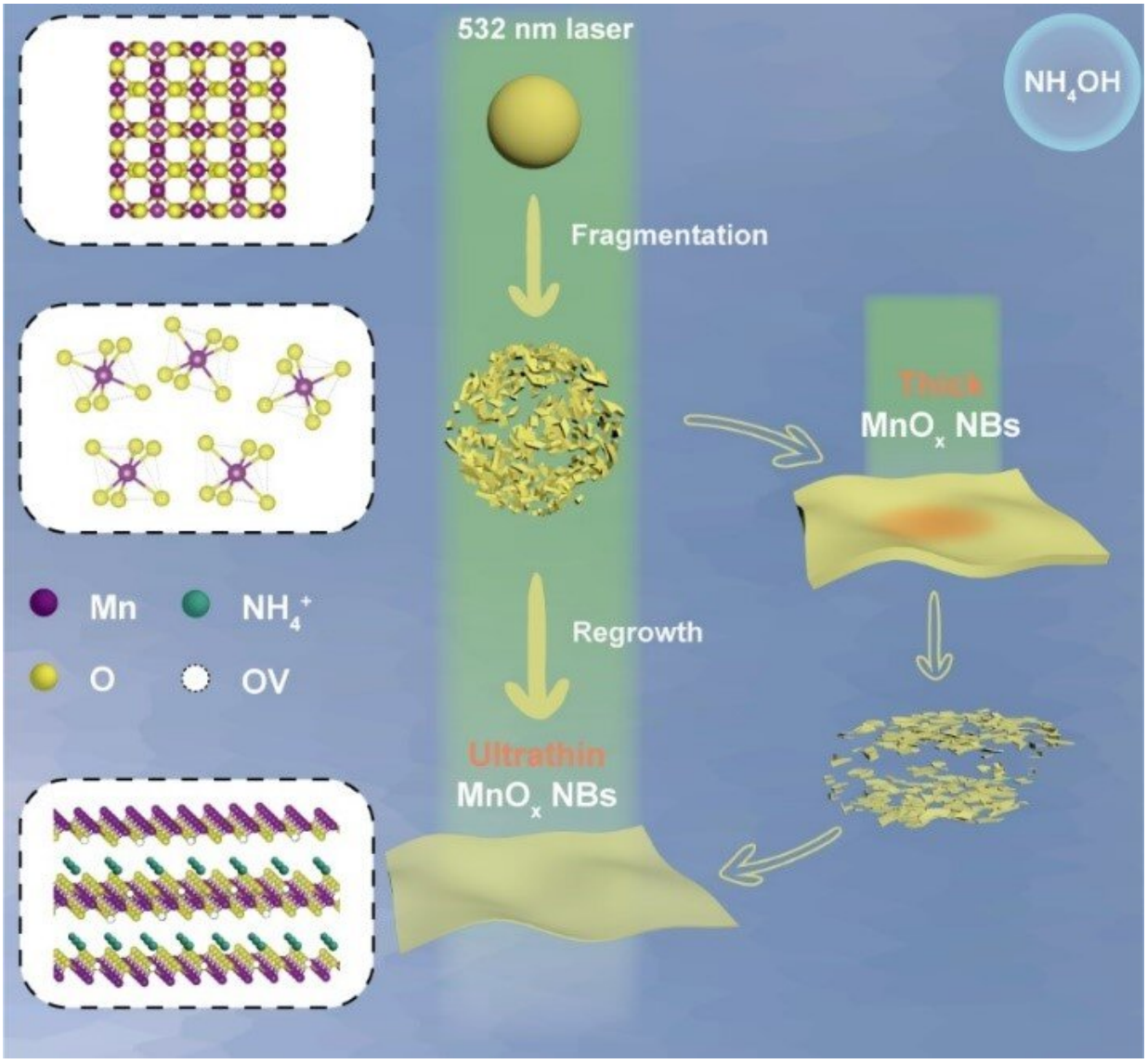

Growth mechanism of the ultrathin MnO_x NBs. Credit: Ji Shihan

A recent study published in *Sensors and Actuators: B. Chemical* highlights the development of highly active oxidase mimics using MnO_x nanobelts (NBs) generated through laser irradiation in liquid (LIL) techniques by researchers from Institute of Solid State Physics, Hefei Institute of Physical Sciences, Chinese Academy of Sciences.

Although nanozymes with oxidase mimic activity have shown promise for biomarker sensing, their lower activity compared to natural enzymes has constrained their wider application.

In this research, the team identified that MnO_x NBs with an ultrathin layered structure improve catalytic active site exposure and the negative charge layer of birnessite-type MnO_x NBs enhances affinity for positive substrates such as 3,3',5,5'-tetramethylbenzidine (TMB).

Significantly, oxygen vacancies created via laser irradiation reduced the adsorption energy of the MnO_x NBs for oxygen, resulting in excellent substrate affinity (K_m = 0.0087 mM) and high catalytic rate (V_{max} = 6.04 × 10^{-7} M/s).

Furthermore, glutathione (GSH) inhibition of nanozymes with oxidase (OXD) mimics was exploited in the establishment of a fast and highly sensitive method for GSH determination.

These findings may provide new strategies for synthesizing highly active nanozymes for biomarker applications.

More information: Sihan Ji et al, Laser-generated defect-rich MnOx nanobelts with high oxidase mimic activity for glutathione detection, *Sensors and Actuators B: Chemical* (2023). DOI: 10.1016/j.snb.2023.133595

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