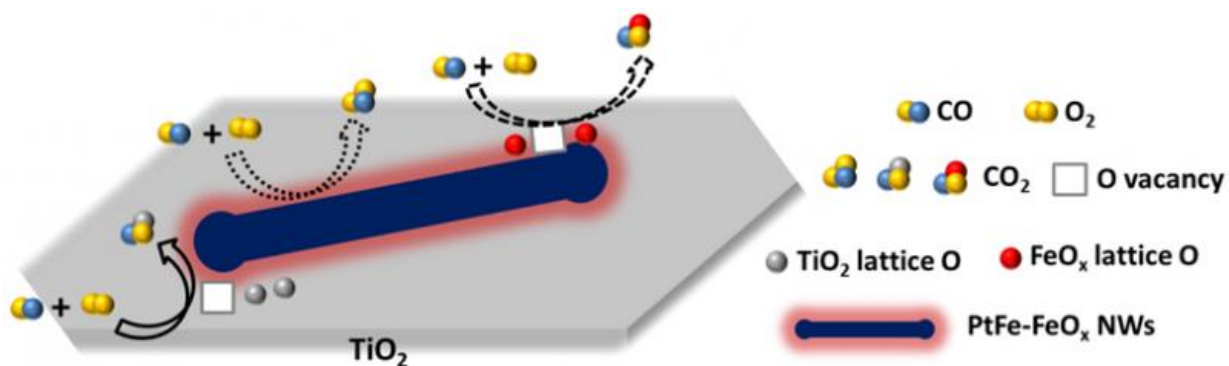


Room temperature oxidation of carbon monoxide with 100% efficiency

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(Top) Schematic illustration of the two oxidation reaction regimes within the PtFe- $\text{FeO}_x/\text{TiO}_2$ system. (Bottom) This new nanomaterials system could have a profound impact on the reduction of carbon monoxide pollution, improving air quality.

Ultra-thin 1-dimensional (1D) nanowires (NWs) have emerged as a new class of effective nanoscale catalysts, exhibiting impressive activity and durability, as demonstrated by their excellent performance in fuel cell reactions.

A [collaborative effort](#) among scientists from Oak Ridge National Lab, the University of Tennessee, Zhejiang University of Technology, and CFN has produced unique 1D, core-shell PtFe-FeO_x NWs, supported on a TiO₂ substrate, that yield highly efficient, room temperature carbon monoxide (CO) oxidation. Atomic level interactions between the PtFe core and the FeO_x shell and interactions between the NWs and the TiO₂ substrate enabled CO oxidation with 100% conversion efficiency at room temperature. Additionally, after 30 hours in the reaction environment, the PtFe-FeO_x/TiO₂ NW catalyst exhibited no decay in the catalytic activity. These results provide a general approach and new insights into the construction of hierarchical interfaces for advanced catalysis. These results also could provide a highly efficient and potentially cost-effective means for carbon monoxide air pollution abatement and CO-based [fuel cell](#) operation.

These 1D nanostructures enable CO [oxidation](#) with 100% conversion efficiency at [room temperature](#), which could provide insight into the production of hierarchical interfaces for advanced catalysis. Further, this work could eventually lead to a highly efficient and cost-effective means for CO air pollution abatement.

The CFN Electron Microscopy Facility's HD2700C Scanning Transmission Electron Microscope was used to characterize the samples.

More information: "Constructing Hierarchical Interfaces: TiO₂-Supported PtFe-FeO_x Nanowires for Room Temperature CO Oxidation." *J. Am. Chem. Soc.*, 2015, 137 (32), pp 10156–10159 [DOI: 10.1021/jacs.5b07011](#)

Provided by Brookhaven National Laboratory

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