

# Scientists develop surface acidity- and selectivity-tunable manganese oxide catalyst

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A research group led by Prof. Xu Jie from the Dalian Institute of Chemical Physics (DICP) of the Chinese Academy of Sciences has developed a surface acidity- and selectivity-tunable manganese oxide

catalyst using a surface modification technique. Their findings were published in *Nature Communications*.

Surface properties of transition metal oxides play a pivotal role in their catalytic applications. Despite numerous reports investigating the [surface](#) chemisorption of organic molecules on metal oxides, it is not clear how adsorption of organic modifiers can be exploited to optimize the catalytic properties of [metal oxides](#).

The researchers used enolic acetylacetonates to modify the surface Lewis acid properties of manganese [oxide](#) catalysts. This enabled rational control of the oxidation selectivities of structurally diverse arylmethyl amines so they could switch from nitriles to imines.

The stable modification of acetylacetonates strongly influenced the redox-acid cooperative catalysis of MnOx by suppressing the surface Lewis acidity of the catalysts. In the aerobic oxidation reaction of benzylamine, using unmodified MnOx as [catalyst](#), nitrile was obtained with a yield of 86.5%. In contrast, the MnOx modified by acetylacetonates produced imine with a yield of 90.6% under identical conditions.

The current study demonstrates an example of a selectivity-switchable metal oxide catalyst with an organic switch to tune its surface properties. This may contribute to future insights into the surface structure-activity relationships of metal oxide catalysts.

**More information:** Xiuquan Jia et al, Switching acidity on manganese oxide catalyst with acetylacetonates for selectivity-tunable amines oxidation, *Nature Communications* (2019). [DOI: 10.1038/s41467-019-10315-9](https://doi.org/10.1038/s41467-019-10315-9)

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