Novel catalyst for electrochemically selective C=O hydrogenation of cinnamaldehyde

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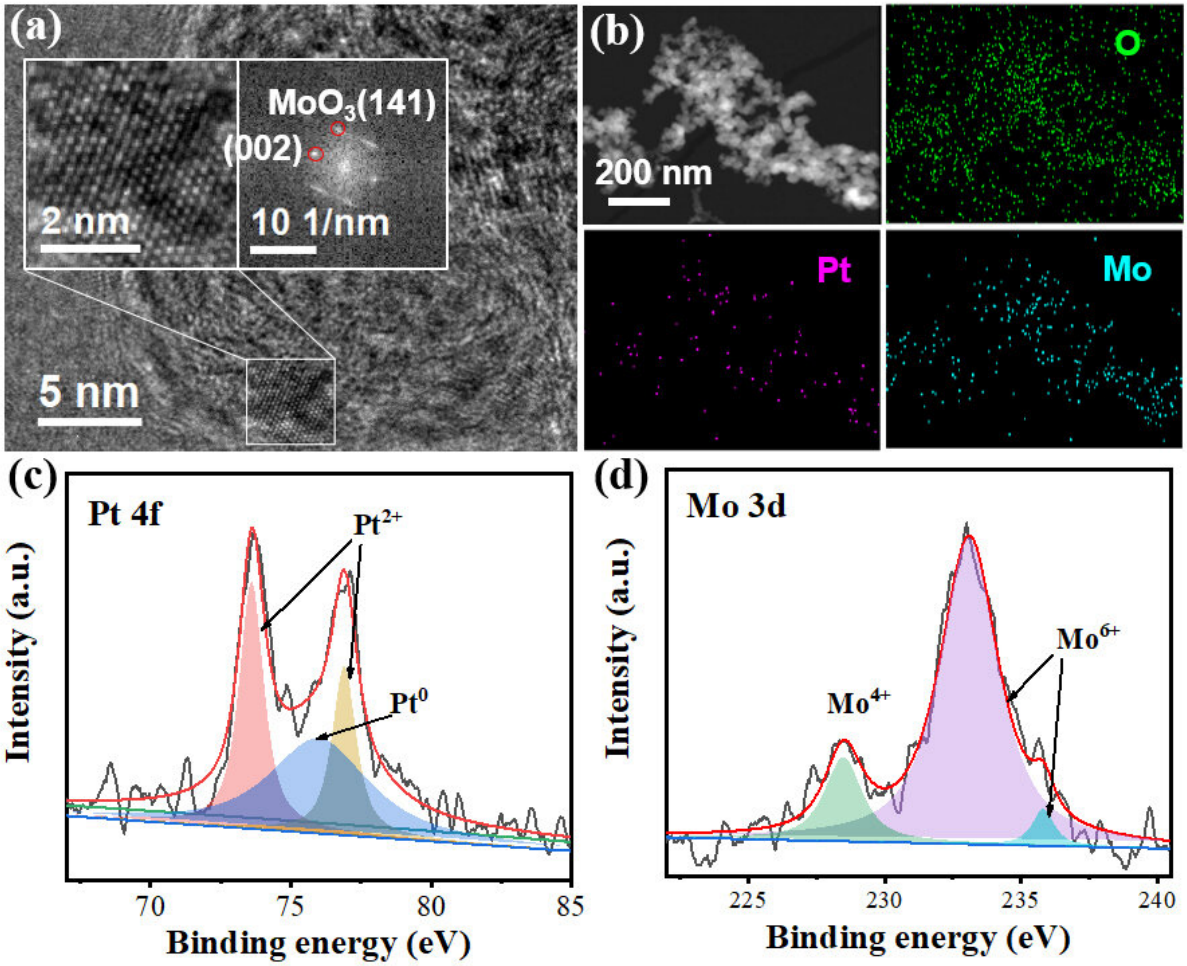

HRTEM and elemental mapping results of Pt-MoO_3/C. Credit: Wang Jialu

Researchers from the Institute of Solid State Physics, Hefei Institutes of Physical Science of the Chinese Academy of Sciences, reported a carbon-supported, Pt-modified MoO_3 nanoparticle catalyst for electrochemically selective C=O hydrogenation of cinnamaldehyde to produce cinnamyl alcohol.

Their findings were published in *Chemical Communications*.

Cinnamaldehyde (CAL), a representative chemical for α, β-unsaturated aromatic aldehydes, has been widely used in hydrogenation reactions to yield high-value-added products, among which cinnamyl alcohol (COL) is usually applied as a flavor additive and pharmaceutical raw material.

In this work, the researchers synthesized Pt-modified MoO_3 ultrafine particles loaded on active carbon (Pt-MoO_3/C). Electrochemical characterization results demonstrated the apparent reduction peak after the introduction of CAL, and the strong adsorption of CAL on the electrode surface led to a concentration increase in the negative shift of reduction peak.

As an electrocatalyst, Pt-MoO_3/C exhibited superior electrocatalytic hydrogenation activity towards CAL to COL with high conversion of 99% and selectivity of 78% at -0.4 V, and the Faradaic efficiency could reach 50% when doubling the Faraday equivalents of electric quantity applied.

The calculation results indicated that the high selectivity towards COL originated from the synergistic effect of the Pt and Mo species, which could selectively adsorb the C=O bond of the CAL molecule via vertical adsorption configuration, thus improving the CAL hydrogenation selectivity to generate COL.

More information: Jialu Wang et al, Pt-Modified MoO3 catalyst for

the electrochemically selective C=O hydrogenation of cinnamaldehyde, *Chemical Communications* (2022). DOI: 10.1039/D2CC01527G

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