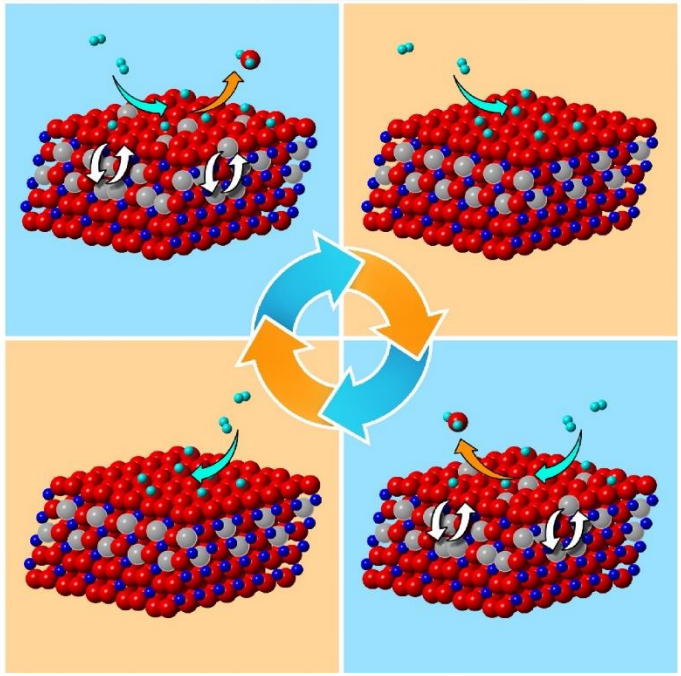
# On a Quest to Tailor the Reactivity of Oxide Catalysts



*The cyclic formation of $H_2O$ molecules at the surface induces the cyclic order-disorder transformations of oxygen vacancies in the subsurface.*

## Scientific Achievement

**Scientists studied hydrogen oxidation over CuO surfaces by simultaneously resolving structural changes of the catalyst from the surface and subsurface at the atomic scale in real time.**

## Significance and Impact

**By differentiating between the surface and subsurface states, these results have a broader applicability that is relevant to a wide range of chemical processes involving surface–subsurface mass transport such as heterogeneous catalysis, oxidation, corrosion and carburization.**

## Research Details

- Cyclic oscillations take place in the form of ordering and disordering of oxygen vacancies in the subsurface
- Structural oscillations in subsurfaces are induced by the cyclic loss of oxygen from the oxide's surface
- CFN Advanced UV and X-ray Probes Facility was used
- X-ray Photoelectron Spectroscopy measurements were carried out at the IOS beamline, in an endstation built in partnership between CFN and NSLS-II.

X. Sun, W. Zhu, D. Wu, C. Li, J. Wang, Y. Zhu, X. Chen, J.A. Boscoboinik, R. Sharma, G. Zhou, Nature Communications 11, 305 (2020).

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