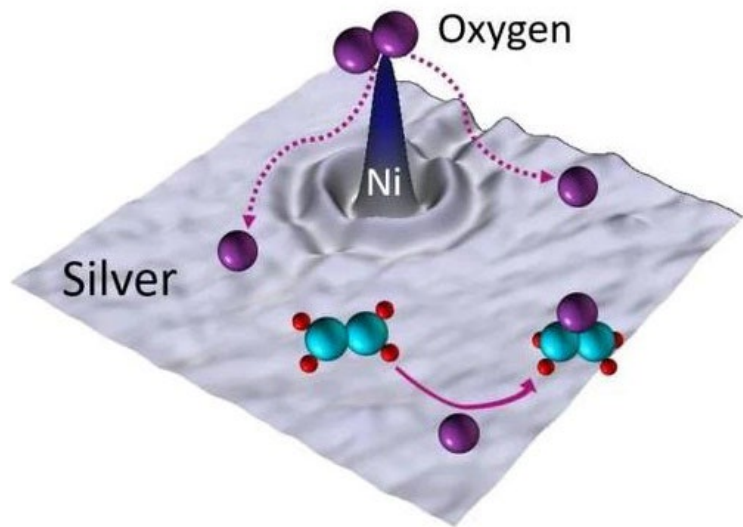


Trace Amounts of Nickel Boost Silver's Selectivity for Essential Catalysis



Nickel atoms on the surface of the silver particle enhance oxygen dissociation, enabling the efficient production of ethylene oxide.

A. Jalil, E. Happel, L. Cramer, A. Hunt, A.S. Hoffman, I. Waluyo, M.M. Montemore, P. Christopher, E.C.H. Sykes, *Science*, **387**, 869-873 (2025). DOI:10.1126/science.adt1213

Scientific Achievement

A theory-based search revealed that trace amounts of nickel (Ni) boost the selectivity of ethylene epoxidation on silver (Ag), a chemical reaction that turns ethylene into a useful compound called ethylene oxide (EO), about 25% more efficiently.

Significance and Impact

Ethylene oxide, used in products like plastics and antifreeze, has a \$40B global market. Improving reaction selectivity by just 1% could save ~\$200M annually by reducing ethylene loss to combustion.

Research Details

- Theory calculations predicted that Ni and Ag interact reducing the barrier to form EO instead of side products
- X-ray photoelectron spectroscopy revealed that Ni stabilizes nucleophilic oxygen, which is believed to decrease the rate of total combustion.

Work was performed in part at NSLS-II

