

Making Better Catalysts Through Defect Engineering

Scientific Achievement

A CINT User Team engineered defect-rich catalytic interfaces by creating high-density Co_2P - CoP phase boundaries inside branched cobalt phosphide nanoparticles via kinetically controlled phosphidation.

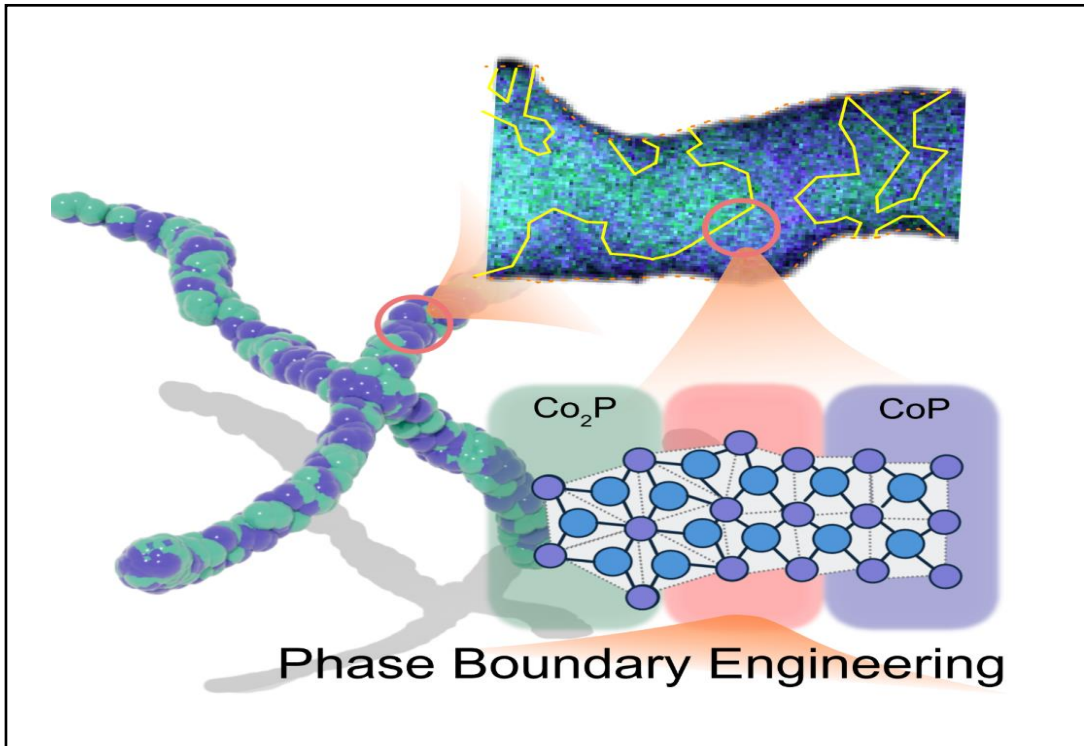


Figure: The polycrystalline mixed-phase Co_2P - CoP branches are enriched with phase boundaries

Significance and Impact

These boundary defects exhibit 3.5x higher activity than either Co_2P or CoP alone, outperforming commercial Ru catalysts.

Research Details

- Slow transformation from Co_2P to CoP is key to achieving Co_2P - CoP phase boundaries.
- The Co_2P - CoP catalyze OER at an overpotential that is 81 mV lower than that of a commercial RuO_2 standard.

Ramadhan, Z. R.; Cheong, S.; Saha, S.; Li, Q.; Zheng, X.; Somerville, S. V.; Poerwoprajitno, A. R.; Kumar, P. V.; Dai, L.; Gooding, J. J.; Tilley, R. D. Phase Boundary Engineering of CO_2 P-cop Branched Nanoparticles Enhances Cobalt Oxidation for Oxygen Evolution Electrocatalysis. *Advanced Materials*. 2026.

Work was performed, in part, at the Center for Integrated Nanotechnologies.