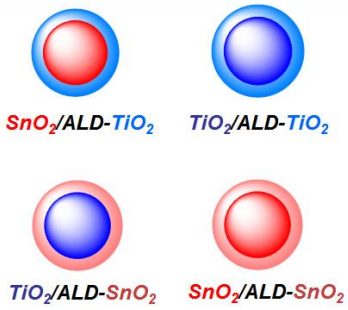
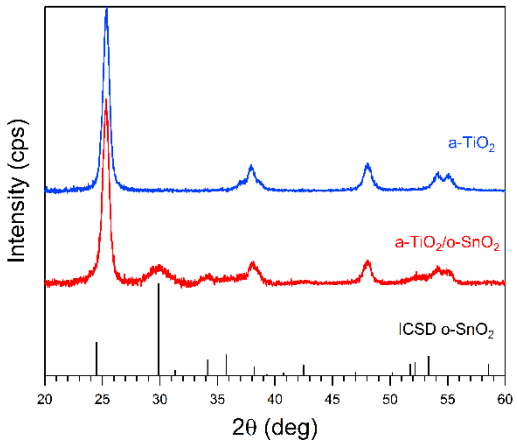
SnO_2 ALD to Unlock the Secrets of Core/Shell Performance

Scientific Achievement

Atomic layer deposition (ALD) route to SnO_2 developed to access new core/shell structures.



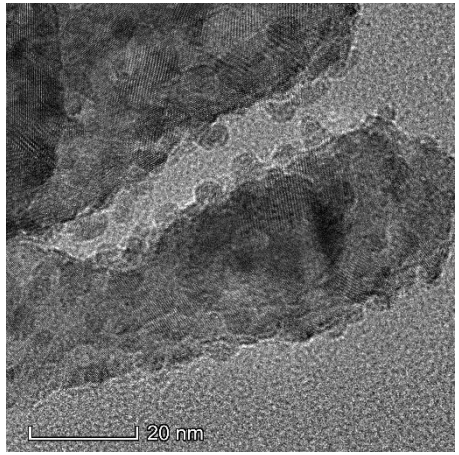


Significance and Impact

Core/shell structures like SnO_2/TiO_2 show excellent performance in photoanode applications, but the mechanism by which they do so is debated. Other core/shell structures are needed to probe the impact of shelling on electronic structure.

Research Details

- ALD synthesis of $SnO_2$is extremely sensitive to all ALD parameters, substrates, and precursors.
- With rutile substrates, rutile SnO_2 'shells' are deposited.
- With anatase substrates, SnO shells are deposited; annealing produces o-SnO_2, a rare phase typically observed at high T and P.
- After annealing, all TEM images reveal SnO_2 nanocrystals speckling the substrate, not conformal shells.



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Work was performed at the University of North Carolina

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