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Titel des Beitrags:
Oxygen electrocatalysis in alkaline electrolyte: Pt(hkl), Au(hkl) and the effect of Pd-modification

Abstract:
The kinetics of the oxygen redn. reaction (ORR) was studied in alk. electrolyte at 293-333 K on bare and Pd modified Pt(hkl) and Au(hkl) surfaces. The rotating ring-disk electrode technique was used to study the ORR with soln. phase peroxide detected at the ring electrode. Pd modification was either by electrodeposition (Pt) or by vapor deposition in vacuum (Au). The surface concn. of Pd was detd. in vacuum using low energy ion scattering. In agreement to the structure sensitivity found at room temp. previously, on the bare Au(hkl) surfaces the ORR is strongly structure sensitive at 293-333 K, with order of activity being (100)>(110)>(111). The structure sensitivity for Pt(hkl) is much less and varies in nearly the opposite order (111)>(100)>(110). The peroxide intermediate pathway is clearly operative on Au(hkl) surfaces. At elevated temp., significantly smaller amts. of peroxide are formed. The kinetics of the ORR were significantly enhanced by modification of both Pt(hkl) and Au(hkl) surfaces with Pd. The catalytic effect is most pronounced on the surfaces that are less active surfaces in the unmodified state, with enhancement at least an order of magnitude faster kinetics. Pd modification of the Au(hkl) surfaces, therefore, significantly reduces the structure sensitivity of the ORR. Even on the highly active Pt(111) surface the kinetics can be improved by a factor of ∼4 to 4 due to Pd modification. The catalytic enhancement can be achieved with
Stichworte:
Reduction catalysts (electrochem. bare and Pd-modified Pt(hkl) and Au(hkl) for oxygen) Reduction kinetics (electrochem. of oxygen on bare and Pd-modified Pt(hkl) and Au(hkl) electrodes in alk. soln.) Activation enthalpy (in oxygen electrocatalytic redn. on platinum) Crystal orientation (of gold and platinum in oxygen electrocatalytic redn. on bare and Pd-modified Pt(hkl) and Au(hkl) electrodes in alk. soln.) Reduction (of oxygen on bare and Pd-modified Pt(hkl) and Au(hkl) electrodes in alk. soln.) Electrodeposits (palladium electrodeposits on platinum for electrocatalysts for oxygen redn.) oxygen redn alk electrolyte palladium modified platinum gold electrocatalyst kinetics oxygen redn palladium modified platinum gold electrocatalyst

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CAN 138:46221 72-2 Electrochemistry Lawrence Berkeley National Laboratory, Materials Sciences Division, University of California, Berkeley, CA, USA. Journal 0013-4686 7782-44-7 (Oxygen) Role: PRP (Properties), RCT (Reactant), RACT (Reactant or reagent) (electrochem. redn. in alk. electrolyte on bare and Pd-modified Pt(hkl) and Au(hkl)); 14280-30-9 (Hydroxide); 14691-59-9 (Peroxide ho2-) Role: FMU (Formation, unclassified), PRP (Properties), FORM (Formation, nonpreparative) (formation in oxygen electrocatalytic redn. on bare and Pd-modified Pt(hkl) and Au(hkl) electrodes in alk. soln.); 7440-05-3 (Palladium) Role: CAT (Catalyst use), CPS (Chemical process), DEV (Device component use), PEP (Physical, engineering or chemical process), PRP (Properties), PROC (Process), USES (Uses) (oxygen electrocatalytic redn. on bare and Pd-modified Pt(hkl) and Au(hkl) electrodes in alk. soln.); 7440-06-4 (Platinum); 7440-57-5 (Gold) Role: CAT (Catalyst use), DEV (Device component use), PRP (Properties), USES (Uses) (oxygen electrocatalytic redn. on bare and Pd-modified Pt(hkl) and Au(hkl) electrodes in alk. soln.); 1310-58-3 (Potassium hydroxide) Role: NUU (Other use, unclassified), PRP (Properties), USES (Uses) (oxygen electrocatalytic redn. on bare and Pd-modified Pt(hkl) and Au(hkl) electrodes in soln. of)

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