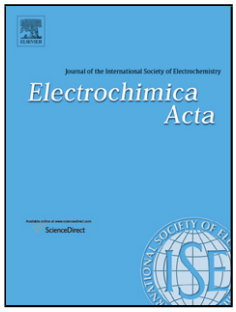

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The Enhanced CO Tolerance of Platinum Supported on FeP Nanosheet for Superior Catalytic Activity Toward Methanol Oxidation

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Abstract: The inferior CO-like intermediates tolerance of Pt nanoparticle greatly hampered the MOR activity and durability. To alleviate this issue, tremendous efforts have been made to create oxygen-containing groups on neighbouring Pt site for oxidizing the poisonous carbonaceous species. Given this, two-dimensional FeP nanosheet with excellent HER activity was utilized as support and cocatalyst. FeP nanosheet with special $Fe^{\delta+}$ and $P^{\delta-}$ active sites was conductive to mass transfer, fast charge transfer and facilitating water dissociation for generating OH species to removal CO-like intermediates on Pt sites. The XRD, XPS, SEM and TEM analysis demonstrated that the Pt nanoparticle with an average size of 3.68 nm was successfully deposited on the FeP nanosheet surface. The methanol oxidation experiments in acidic medium revealed that the as-prepared binary Pt/FeP nanosheet hybrid exhibited superior MOR activity with enhanced anodic peak current density of 0.994 mA/cm^2, which was 2.74-fold greater than that of commercial Pt/C, and the intensive CO oxidation peak potential was negatively shifted about 100 mV with respect to that of Pt/C. The better CO tolerance of Pt/FeP nanosheet hybrid might be attributed to cooperative effect from down-shifted d-band center of Pt, abundant hydroxyls on the Pt/FeP and special activity of $Fe^{\delta+}$ and $P^{\delta-}$. In addition, this hybrid