Title:	Boosting Bifunctional Oxygen Reduction and Methanol Oxidation Electrocatalytic Activity with 2D Superlattice-Forming Pd Nanocubes Generated by Precise Acid Etching
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Abstract:	In this work, we report on a facile one-pot synthesis route to obtain Pd nanocubes (PdNCs) in water assisted by halide ions and poly(vinylpyrrolidone) under the precise control of acid etching. While the NaI concentration is known to play an important role in shape control, we show that even a small change in solution pH by less than 0.1 also may impart marked deviation from the desired shape. The as-synthesized Pd NCs have a natural tendency to form a self-assembled two-dimensional (2D) superlattice without requiring additional chelating agents, and they exhibit superior bifunctional electrocatalytic behavior for the oxygen reduction reaction (ORR) as well as methanol oxidation reactions (MORs). The ORR and MOR mass activities of the Pd NCs are 0.78 A/mg and 2.23 A/mg, respectively. Furthermore, the PdNCs also exhibit a remarkable durability with only 12 mV decrease in ORR half-wave potential after 10 000 cycles. This effective and simple strategy to prepare Pd nanocubes can probably be extended to prepare other noble metal cubes forming superlattices and showing enhanced electrocatalytic activities.
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