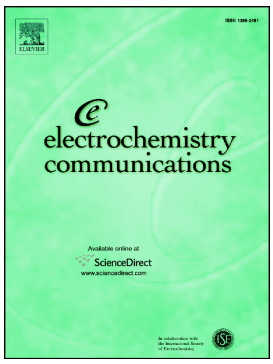

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A simple cathodic process for carboxylating noble metals and generating new versatile electrode interfaces

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Abstract

The electrochemical reactivity of polarized metals such as platinum, palladium, and rhodium toward carbon dioxide in aprotic dimethylformamide (DMF) solutions of tetramethyl-ammonium tetrafluoroborate ($TMABF_4$) is presented. The capacity of metals such as Pd and Pt to cathodically insert the electrolytes under superdry conditions (via the generation of organometallic intermediates analogous to Zintl metals) is combined with the concomitant carboxylation of those metals within a potential range from -1V to -2.5V vs. Ag/AgCl/KCl($_{sat}$). Under these conditions, dense surface carboxylation of these precious metals occurs, totally suppressing their catalytic activity. Thick layers of the carboxylated metals (platinum-CO_2^- and palladium-CO_2^-) are chemically stable and may then be further functionalized for specific applications.

Key words: Cathodic carboxylation; Modified platinum; Modified palladium; Chemically modified solid surfaces.

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