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J Pollut Eff Cont 2017, 5:2 (Suppl)
DOI: 10.4172/2375-4397-C1-006

Development of RuO_2 nanorod and nanosheet electrodes for high chlorine electrocatalytic activities

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RuO_2 is current used as common active component of Dimensional Stable Anode (DSA) in chlorine evolution. Recently, the improvement of chlorine electrocatalytic activity by using nanostructures of RuO_2 electrodes received a lot of attention in the chlor-alkali industry in order to reduce the energy consumption of this process. In this study, the RuO_2 nanorod and nanosheet electrodes have been facile fabricated by using sol-gel method with organic surfactants as templates. The obtained RuO_2 nanorod and nanosheet electrodes show enhanced about active surface areas, especially outer active surface areas, which are attributed to the increase of mass transfers in comparison with the conventional nanograin electrode, respectively. The chlorine electrocatalytic activities increase up to 20% in case of nanorod electrode and 35% in case of nanosheet electrode in comparison with nanograin electrode. The RuO_2 nanorod with morphological features of 80 nm length, 20-30 nm width and the RuO_2 nanosheet with 40-60 nm length, 40 nm width are formed on the surface of Ti substrates. These results manifest that the template RuO_2 nanorod and a nanosheet electrodes are promising anode materials for chlor-alkali industry in future application.

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