Composites of Pd nanoparticles and nanoporous anodic tin oxide

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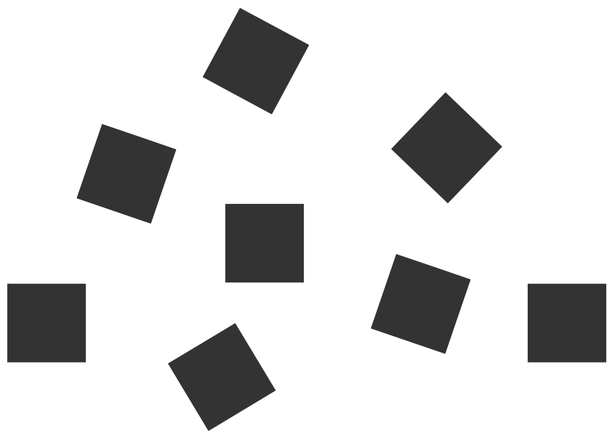


Nanostructured Pd

Essential catalyst for various reactions in fine organic synthesis industry.

RSC Adv., 2014, 4, 54487.

Nanoporous anodic SnO_x

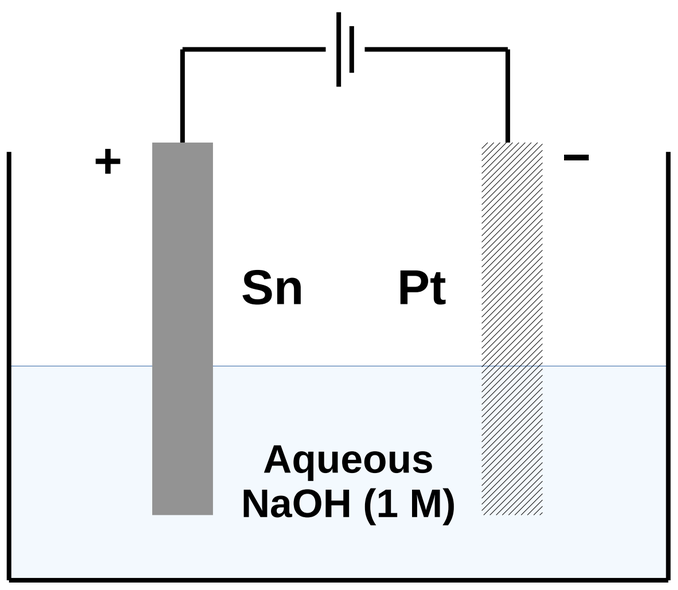
A promising carrier for improving reproducibility of catalytic properties, simplifying the catalyst separation from the products as well as adaptation to processes in flow mode.

Possesses high specific surface area, redox-activity, semiconductor properties.

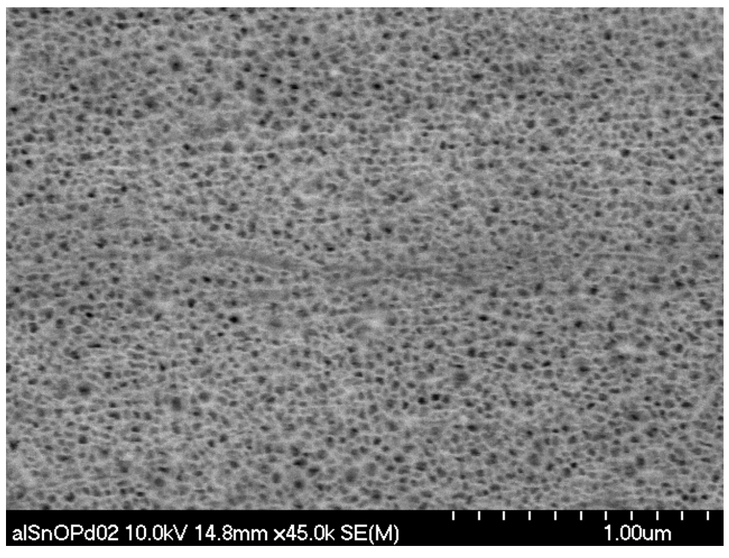
Moreover, the materials based on anodic SnO_x could be applied for photoelectrochemistry, development of sensors *etc*.

The aim of the work is to elucidate possibility of creation of nanocomposites by impregnation of tin oxide nanopores by a Pd salt followed by reduction of the latter as well as to characterize structure of such composites.

Formation of SnO_x



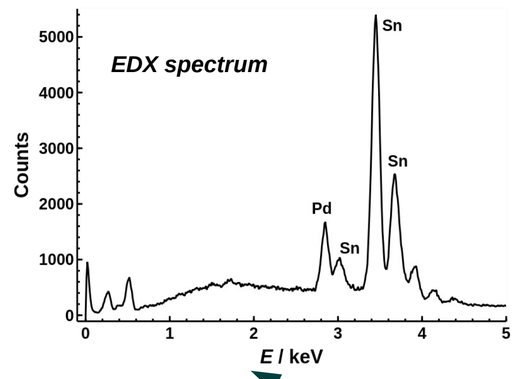
4 V, 10 min

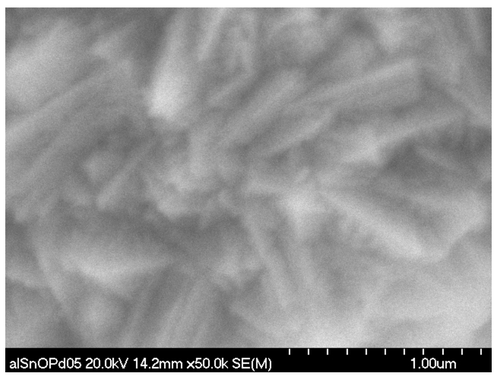


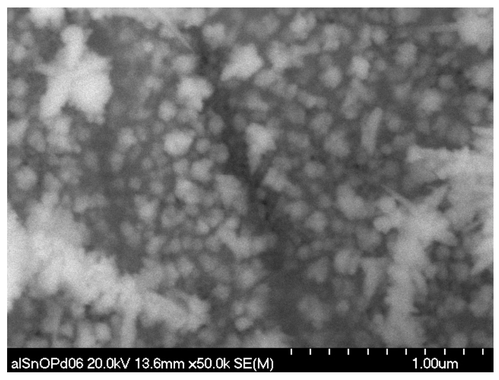
L. Zaraska et al, Electrochim. Acta, 2019, 319, 18

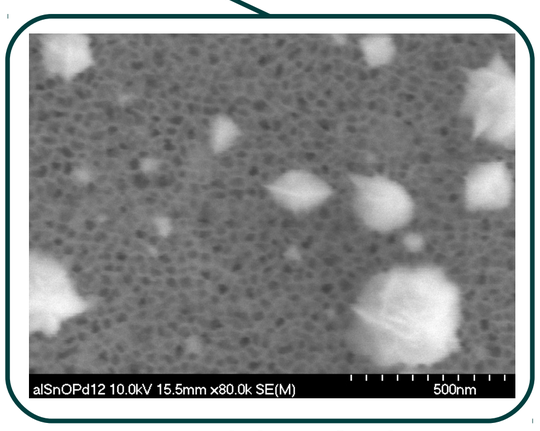
Impregnation of SnO_x by Pd nanoparticles

Treatment of the SnO_x layer with solutions containing various $[PdCl_4]^{2-}$ concentrations for 1–15 min









Total occlusion of SnO_x surface by Pd

Separate particles of Pd on the top of the surface

Decrease of $[PdCl_4]^{2-}$ concentration

Conclusions:

- **Pd/SnO_x composites have been formed readily upon treatment of anodic tin oxide layers by solutions containing $[PdCl_4]^{2-}$.**
- **SnO_x reduced $[PdCl_4]^{2-}$ to Pd^0 without any additional reducers, allegedly via Sn^{2+} ions within SnO_x layer.**
- **The SnO_x structure acted as a template for the deposition of the nanoparticles formed as "plugs" closing the pores.**

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