HYDROTHERMAL SYNTHESIS OF SnO_2, CHARACTERIZATION AND ELECTROCHEMICAL DETERMINATION OF 1-NAPHTOL

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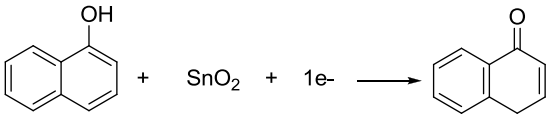
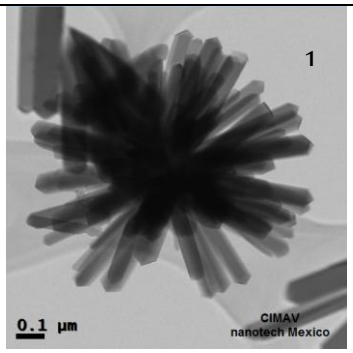
SnO_2 nanostructures with 3D morphology were synthesized by a simple hydrothermal method, The powders were characterized by X-ray diffraction, transmission electron microscopy and scanning electron microscopy.

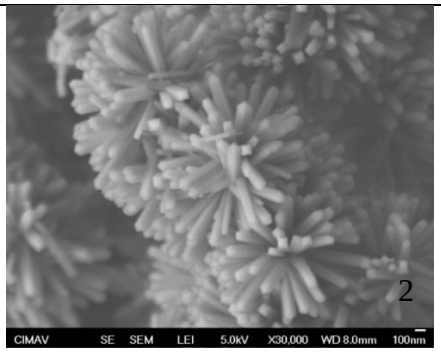
SnO_2 nanoflowers were successfully synthesized by hydrothermal route. In a typical procedure, $SnCl_4$ and NaOH in tri-distilled water solutions were mixed and kept in constant agitation until reach a stable clear solution. Then it was added Ethanol to the solution containing the tin tetrachloride and NaOH by dropwise; the compound solution was transfer to a Teflon vial and stainless steel autoclave and temperature was rise at 200 ° C maintained for 48 hours [1]. After reaction time a blue powders was collected. The characterization was carried out by Field Emission Scanning Electron Microscope (FESEM), the analysis were performed using JSM 7401F microscope was operated at 5.0 kV, Transmission Electron (TEM) images and scanning transmission electron (STEM) micrographs were acquired by JEOL JEM2200FS equipment.
Figure 1 shows BF TEM image and can be observed the morphology of the synthesized SnO_2 nanostructure results like flowers are square rods radiate from the center outward. Figure 2 shows same morphology obtains by SEM equipment. Figure 3 shows XRD patterns. It show that the crystalline structure of SnO_2 corresponds to Cassierite (reference 01 -072- 1147).
The nanomaterials synthesized in these work were evaluated as electrocatalytic material in the oxidation reaction of 1-naphthol, because this material makes the detection of 1-naphthol in concentration ranges from 1-5 and 10-50 1-5 µM y 10-50µM in a range of potential of 0.25 to 0.6 V. The reaction occurring is oxidation of 1-naphthol as shown in Scheme 1.

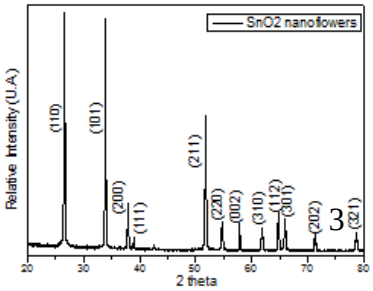


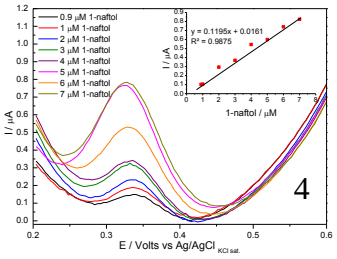
Scheme 1

The graphite electrode modified SnO_2 nanoflower, showed a detection interval of 0.9 to 7µM, with a detection limit of 7.37 x 10^{-6} M and a sensitivity of 0.1195 µA/µM; the results of the electrocatalytic oxidation of 1-naphtol were carried out by differential pulse voltammetry and are shown in Figure 4.









References

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