Carbon nanotubes growth over titanium as catalyst support for hydrogen production

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Abstract.

Large surface area supports are ideal for electrode fabrication in fuel cells applications and electrolyzers. The large surface area support should minimize catalyst loading. Carbon nanotubes (CNT) offer an ideal opportunity as a support. However, in order to be utilized the used of binders is required. The binders used are not active for the catalysis and affect the electronic conductivity of the catalyst. In this paper an alternate approach is evaluated for the fabrication of large surface area supports using carbon nanotubes.

Carbon nanotubes were synthesized over a titanium foil via the spray pyrolysis technique. Ferrocene was used as catalytic agent and toluene as carbon source. The employed system consist of a Vycor tubing set inside a cylindrical furnace connected to a pneumatic nozzle similar to the used in previous work.[1] In order to obtain the CNT growth over the titanium, two different ways to set the foil inside the Vycor tube were tested. In the first experiment a 6 mm X 60 mm section of the foil was situated horizontally and in the center of the tubing. The second experiment was to set the foil section rolled over the inner surface of the vycor tubing. For both cases CNT were analyzed by scanning electron microscopy (SEM). Figure 1 show the CNT obtained in the experiment 1, the CNT are not alignment, with heterogeneous diameters and lengths. It was demonstrated that due to the system conditions and the technique, the carbon nanotubes growing is in radial way over the Vycor tubing surface [1]. So with the titanium foil around the Vycor tubing (experiment 2) the CNT are aligned with length about the 10-15 micrometers (Figure 2).

In this paper the substrates produced will be tested for the electrolysis of ammonia in alkaline media for the production of hydrogen on demand.[2]

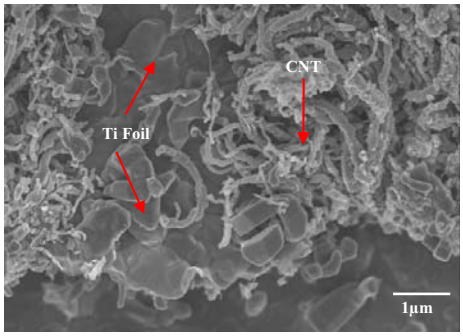

Figure 1. SEM micrograph of CNT obtained with the Experiment 1.

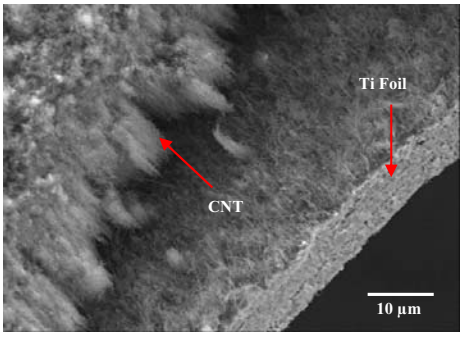

Figure 2. SEM micrograph of CNT obtained with the Experiment 2.

References

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