Hydrogen evolution reaction from brass nanostructures

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With the increasing population and rise of energy-consuming lifestyles, the novel ways of energy production technologies trigger more and more attraction. Among them, the production of hydrogen plays a crucial role especially the production of green hydrogen. Metal oxide nanocomposites are widely used in various fields of science and technology, such as gas sensors, photocatalysts, electrocatalysts and electrochemical sensors. Oxide materials derived from copper and zinc found their application in numerous catalytic processes thanks to their accessibility, reasonable price and adaptability. It has been reported that the ZnO-CuO or CuO-ZnO nanocomposite systems are studied for water splliting and hydrogen evolution properties, as well as their photocatalytic activity and electrochemical sensing [1,2]. In comparison to other synthesis methods, electrochemical CuZn oxidation quickly forms nanostructured oxide film on the electrode surface and allows good control of morphological properties.

In this study, electropolished brass was anodized in 1.0 M NaOH with the addition of 10^{-4} M potassium permanganate $KMnO_4$ as an oxidation booster. Anodization was performed using potentiostat and a three-electrode system in order to form nanostructures. The morphology of CuZn alloy surface depends on the applied potential [3].

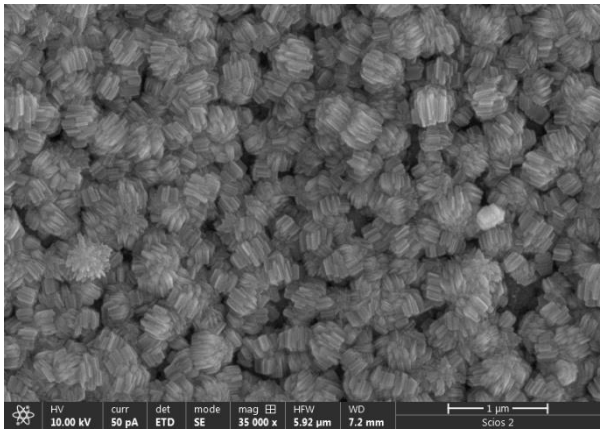

Figure 1. Morphology obtained during potentiostatic oxidation of CuZn alloy in 1M NaOH and 10^{-4}M $KMnO_4$ at 100mV

SEM micrograph shows barrel-like structures which are formed when 100mV potential is applied. It has been shown that the morphological properties of the samples are the predominant factor that has to be controlled to develop a good catalyst for hydrogen evolution reaction.

References

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