Hydrogen generation via sodium borohydride hydrolysis using nanostructured ruthenium-nickel catalyst supported on the titanium surface

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Hydrogen is a clean energy source for electric devices and vehicles as its chemical energy can be easily converted to electric energy by polymer electrolyte membrane fuel cells (PEMFCs). A search of a convenient and safe H_2 storage and production systems is still in progress.

Here we present the study of nanostructured Ru layer, which was deposited on the Ni/Ti surface, for the catalytic hydrolysis of sodium borohydride. A thin electroless nickel film of about 300 nm was chosen as an underlayer for the formation of ruthenium overlayer onto the titanium surface. Ruthenium was electrolessly deposited on the Ni/Ti electrode using the ruthenium plating bath [1].

The morphology and composition of prepared catalysts were characterized using field-emission scanning electron microscopy and energy dispersive X-ray spectroscopy. The catalytic activity of nanostructured Ru(Ni)/Ti catalysts with different Ru loadings was determined by measuring the amount of hydrogen generated directly from aqueous alkaline solutions of sodium borohydride. The data on hydrogen generation volume with respect to time at different concentrations of sodium borohydride and different temperatures have been presented.

It was found that the nanostructured Ru(Ni)/Ti catalysts are highly active catalysts for the hydrolysis of sodium borohydride.

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References

[1] A. Žielienė, P. A. Vaškelis and E. Norkus. "*Plating solutions for electroless deposition of ruthenium*". U. S. Pat. 7,682,431 (2010).