

INFORMATION ON NEW CONCLUSIONS OF DOCTORAL THESIS

Thesis title: “ *Study on synthesis of catalyst based on TiO₂ nanotubes used as photoanode electrode for hydrogen generation via water splitting using visible light*”

Specialization: **Theoretical Chemistry and Physical Chemistry**

Code No.: **62.44.01.19**

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Scientific Advisors: **1. Assoc. Prof. Dr. Nguyen Dinh Lam**

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Name of Institution: **Vietnam Institute of Industrial Chemistry**

Summary of new contributions of the thesis:

- Systematic survey of anodized method used to fabricate TNTA and identified suitable working conditions: electrolyte solution containing 0.5% Glycerol, 5% NH₄F with H₂O, temperature, at the voltages 40V, electrolytic time 8 hours, the temperature under the sample processing is 450°C, 3h. The obtained TNTA is uniform tube array structure, length of 3 micron, diameter of 130 nm; with components that anatase phase.
- Successfully synthesized a Pt/rGO/TNTs composite by hydrothermal method. The characteristics result of this composite clearly shows role of Pt and RGO in reducing the recombination of photogenerated electrons/holes pair and increases photocatalytic performance of TNTs.
- Photoactivity evaluated results of catalyst coated electrode in MB photodecomposition reaction showed catalyst Pt/rGO/TNTs coated electrode exhibit higher photochemical activity. This has opened up application trends of Pt/rGO/TNTs catalyst coated electrode in water photoelectrolysis reaction into hydrogen.
- Systematically studied on fabrication method CdS doped TNTA electrode and identified: 20 immersion cycles, CdS/TNTA-20 electrode exhibit the best photochemical performance.
- Surveyed and evaluated the stability of the CdS/TNTA-20 electrode in the water photoelectrolysis reaction. The result shows that in the S²⁻ ion containing electrolyte solution, operations of this electrode are more stable and durable than these in the conventional KOH electrolyte solution. The photocatalytic activity in the photoelectrolysis shows that, the amount of hydrogen generated reached 1.5 ml/h/cm², is 5.6 times higher than this of TNTA electrode.

Hanoi, 3rd March 2017

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