

INFORMATION ON DOCTORAL THESIS

1. Full name: **Nguyễn Thị Thu Thủy**
2. Gender: Female
3. Date of Birth: 01/11/1980
4. Place of Birth: Yên Bái
5. Admission decision Number: 640/QĐ-CTSV dated 3rd September 2015
6. Changes in the academic process: *Change of the original title of the thesis according to the advice of the Institutional Level Examination Committee to the official one*
7. Official Title of the Thesis: Study of the fabrication of the nanoparticles of Ag, Au and of the Au/TiO₂ nanocomposite by means of the plasma-liquid interaction method and investigating some of their properties.
8. Major: Nano Materials and Devices
9. Code: 944012801.QTD
10. Supervisors: Assoc. Prof. Dr. Nguyễn Thế Hiện
Dr. Đỗ Hoàng Tùng
11. Summary of the **new findings** of the Thesis:
 - Experimental plasma-liquid interaction (PLI) facilities with appropriate technological parameters have been developed, set up and utilized for the successful synthesis of the silver nanoparticles (AgNPs) at a high productivity and the nanoparticle conversion rate of 100%. As a result, spherical AgNPs with homogenous size distribution were synthesized by the PLI method with a simple, minor time consumption and environment friendly procedure which show advantageous bacterial destruction activities against conventional and also antibiotics resistant bacteria.
 - A PLI system with the plasma-electrode-above-the-liquid configuration for the HAuCl₄ precursor solution reduction has been developed, set up and utilized to successful synthesis of gold nanoparticles (AuNPs) as well as to reduce HAuCl₄ with surface-modified TiO₂ for the successful fabrication of the Au/TiO₂ nanocomposite which exhibits a high photocatalytic efficiency.
 - The results of the study reveal the important role of the hole oxygenation and the electron reduction passway in the mechanism of MB degradation thanks to the photocatalytic impacts of the nanocomposite Au/TiO₂-NPs under various conditions of light illumination and pH concentrations.
12. Practical application perspectives:
 - Using the PLI method, the AgNPs are synthesized directly from the precursor electrode material, thus, they are of high purity, high stability, possess high antibacterial activity and therefore can have potential effective applications in various areas, such as pharmaceuticals, cosmetics industry, agriculture, fishery, etc...

- The PLI method is a simple, efficient and easy to realized modality for the fabrication of nanoparticles and nanomaterials, also for large scale industrial application. The PLI technological set-ups for the synthesis of the AgNPs possesses high productivity meeting the demands and requirements of industrial production and they are ready for the technological transfer and commercialization.

13. Further research perspectives:

- As shown in this work, the PLI method is a powerful and highly efficient approach for the synthesis of nanoparticles and nanomaterials. Its high application potential for many other fields of the plasma technology nowadays attracts worldwide great attentions. Therefore, further intensive research on the plasma technology, including the PLI method might also be of interest for the research communities in Vietnam.

- Application of the PLI for surface treatments and modifications: investigations on the surface activation of such nanomaterials as TiO₂, Graphene... towards the synthesis and fabrication of new functional materials with novel properties, such as inflammability, mechanical strength etc... and others shall be of interest.

14. Published works related to this thesis:

1. Nguyen Thi Thu Thuy, Do Hoang Tung, Le Hong Manh, Joon Heon Kim, Sergey Ivanovich Kudryashov, Pham Hong Minh and Nguyen The Hien, *Plasma Enhanced Wet Chemical Surface Activation of TiO₂ for the Synthesis of High Performance Photocatalytic Au/TiO₂ Nanocomposites*, Applied Sciences 10(10):3345

2. Nguyen Thi Thu Thuy, Do Hoang Tung, Le Hong Manh, Pham Hong Minh, Nguyen The Hien, *Improvement of the Photocatalytic Activity of Au/TiO₂ Nanocomposites by Microplasma in an NH₃ and H₂O₂ Solution*, J Multidisciplinary Scientific Journal, 5(2), 277-286

3. Nguyen Thi Thu Thuy, Nguyen Thi Thanh Bao, Do Hoang Tung, *Green plasma electrochemical synthesized colloidal silver nanoparticles and their antibacterial activity*, Journal of nanomaterials 2022:1-5

Hanoi, 28th August 2023

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Approvement of the Supervisors

The Author Thesis

Nguyen The Hien

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Nguyen Thi Thu Thuy