

INFORMATION ON DOCTORAL THESIS

1. Full name : Nguyen Thi Khanh Van
2. Gender: Female
3. Date of birth: 24/03/1984
4. Place of birth: Pho Yen –Thai Nguyen
5. Admission decision number: 778/QD-CTSVDated 08/21/2017
6. Changes in academic process:
 - Adjusting supervisor followed the Decision No.619/QD-DT, dated 09/04/2020.
 - Adjusting the title of the doctoral thesis followed the Decision No.1077/QD-DHCN, dated 06/06/2024.
7. Official thesis title: Fabrication of nitrogen-doped TiO₂ nanoparticles by sonoelectrochemical method, investigation of properties and photocatalytic activity
8. Major: Nanomaterials and devices
9. Code: : 9440126.01QTD
10. Supervisors:
 1. Supervisor 1: Assoc.Prof.Dr. Dang VanThanh
 2. Supervisor 2: Prof. Dr.Nguyen Nang Dinh
11. Summary of the new findings of the thesis:
 - An one-step fabricating process of nitrogen-doped TiO₂ and ZnO nanomaterials by ultrasonic electrochemical method using a traditional, environmentally friendly two-electrode system at room temperature was successfully developed.
 - Operational parameters including concentration, reaction time, incubation temperature, ultrasonic energy, etc. were optimized to obtain nitrogen-doped TiO₂ nanomaterial possessing good photocatalytic activity with Cr(VI) and methylene blue in aqueous environment under the influence of visible radiation.
 - A multi-electrode ultrasonic electrochemical system was successfully built to scale up the production of nitrogen-doped TiO₂ nanomaterials using NH₄NO₃ electrolyte, voltage of 25 V, and reaction time of 45 min to obtain a yield of 11.4 g per batch.
 - The photocatalytic mechanism of nitrogen-doped TiO₂ material treating Cr(VI) was explained by the photoreduction reaction of Cr(VI) to Cr(III) in aqueous

environment, proving by combining analyzed results from UV-Vis spectrophotometry and Atomic Absorption Spectrophotometry.

- ZnO nanomaterials fabricated by one-step method using the two-electrode ultrasonic electrochemical system had a wurtzite hexagonal structure with particle size ranging from 40 to 100 nm, surface contact area $\sim 7.68 \text{ m}^2/\text{g}$. The obtained ZnO nanomaterials have good photocatalytic activity when decomposing methylene blue under UVA light illumination in 60 minutes with a decomposition efficiency of 98.2%.

12. Practical applicability, if any:

- Efficient removal of methylene blue and Cr(VI) ion from wastewater using nitrogen-doped TiO₂.

13. Further research directions, if any:

- Study the ability to treat wastewater using nitrogen-doped TiO₂ nanoparticles
- Develop the ultrasonic electrochemical method to fabricate Al-, Ga-, Mg- doped ZnO nanoparticles, ... quantum dots QD-ZnO for quantum dot light-emitting diodes (Q-LED)

14. Thesis-related publications:

1. Pham Huong Quynh, Hoang Minh Trang, Nguyen Thanh Trung, Nguyen Nang Dinh, Dang Van Thanh, Le Phuoc Anh, Nguyen Thi Luyen, **Nguyen Thi Khanh Van*** (2024), "A novel sonoelectrochemical approach for preparing of ZnO nanoparticles", *Nanotechnology*, 35, pp. 265602

2. **Nguyen Thi Khanh Van**, Nguyen Nang Dinh, Nguyen Thanh Trung, Nguyen Nhat Huy, Nguyen Thi Thuy, Dang Van Thanh, Vu Thi Thuy, Pham Huong Quynh, Pham Van Hao (2023), "Straightforward sonoelectrochemical synthesis of TiO₂ nanoparticles for photocatalytic removal of Cr(VI) in water", *Materials Letters* 349, pp. 134800

3. **Nguyen Thi Khanh Van**, Nguyen Nang Dinh, Nguyen Van Chien, Nguyen Nhat Huy, Nguyen Thanh Trung, Tran Quoc Toan and Dang Van Thanh (2021), "A simple and efficient ultrasonic-assisted electrochemical approach for scalable production of nitrogen-doped TiO₂ nanocrystals", *Nanotechnology*, 32, pp. 465602.

4. **Nguyen Thi Khanh Van**, Nguyen Nhat Huy, Nguyen Nang Dinh, Pham Van Hao, Dang Van Thanh, Nguyen Van Dang (2021), "Visible light photocatalysis of TiO₂ nanomaterials particles for textile wastewater treatment", Proceedings of The

11thInternational Workshop on *Advanced in optics photonics spectroscopy and Application*, Publishing House for Science and Technology, pp. 323-329