

INFORMATION ON DOCTORAL THESIS

1. Full name: PHAN THI TUYET MAI
2. Sex: Female
3. Date of birth: 19/4/1982
4. Place of birth: NINH BINH
5. Admission decision number: 671/QĐ-SĐH, date 15/5/2009, Vietnam National University Hanoi.
6. Changes in academic process: None
7. Official thesis title: **Studies and preparations of composite materials containing piezoelectric nanoparticles and investigation the change of thermal-mechanical properties of composite materials in the tropical environments.**
8. Major: Theoretical and Physical Chemistry
9. Code: 62 44 31 01
10. Supervisors:
 1. PGS.TSKH. Luu Van Boi
 2. TS. Nguyen Xuan Hoan
11. Summary of the new findings of the thesis
 1. The optimal condition to preparation the epoxy matrix obtained conversion >99% are the ratio of DDM/DGEBA $r = 1.1$; cycle curing following as three steps: $50^{\circ}\text{C}/30\text{min}$, $110^{\circ}\text{C}/30\text{min}$, $180^{\circ}\text{C}/3\text{h}$;
 2. Polyme composites based on epoxy resin containing γ -APS grafted and ungrafted BaTiO_3 nanoparticles have been prepared and characterized. The results show that, the first, thermal-mechanical properties and dielectric of obtained polyme composite is maximum at 5% weight of BaTiO_3 ; the second, the diffusion and and linkage forming ability of γ -APS treated BaTiO_3 in epoxy matrix are better than those untreated, lead to increase the dielectric constant and strength of materials.
 3. Polymer composites based on epoxy resin reinforced by γ -APS–modified and unmodified glass fiber have been developed and characterized. The results show that the mechanical property of the γ -APS modified glass fiber composites are better than those unmodified; the optimal volume content of γ -APS grafted glass fiber is 45% of the total sample;
 5. Polymer composites based on epoxy resin reinforced by BaTiO_3 deposited glass fiber have been prepared and characterized. The results show that the mechanical properties, thermal-mechanical properties and

dielectric constant of the γ -APS modified BaTiO₃ deposited glass fiber composites are better than those undeposited; the optimal volume content of BaTiO₃ deposited glass fiber is 47 % of total sample;

6. Combining dielectric constant measurement and FT-IR spectroscopy have been developed the new method for monitoring the microstructure of polymer composites; the structural parameters of composite material appeared during the degradation process in different exposure environments are more successfully detected.

12. Paratical applicability, if any:

The findings of the thesis has opened up the possibility of using PC containing piezoelectric BaTiO₃ particles as nanoscale sensors to monitor the changes in the properties of materials used in high-tech fields such as aircraft paint , ships, spacecraft ...

13. Further research directions, if any

1. Research and quantitative relationships between structure and properties of composite polymer materials containing nanoscale BaTiO₃.

2. The research to preparation "sensor" to gauge variations in material properties of high-tech equipment such as aircraft, ships, spacecraft ...

14. Thesis-related publications:

1. Phan Thi Tuyet Mai, Chu Ngoc Chau, Luu Van Boi, Nguyen Xuan Hoan, Ho Thi Anh, Pham Duc Thang, Isabelle Martin, Pascal Carriere (2009), "Influence of surface properties of nano-BaTiO₃ particles on the dielectric behavior of BaTiO₃/epoxy nanocomposites", *International Symposium on Nano-Materials, Technology and Applications*, pp. 48.

2. Phan Thi Tuyet Mai, Luu Van Boi, Nguyen Xuan Hoan , Pham Duc Thang, Isabelle Martin, Pascal Carrière (2010), "A new composite based on epoxy resins matrix reinforced glass fibrous/BaTiO₃ for applications", *Journées Scientifiques Franco–Vietnamiennes « Matériaux nanostructurés et ses Applications*, pp. 15.

3. Nguyen Thanh Thuy, Phan Thi Tuyet Mai, Luu Van Boi, Nguyen Xuan Hoan (2010), "Preparation and properties of PZT/epoxy resin nanocomposites", *The 8th Kumamoto University Forum*, pp. 112.

4. Phan Thi Tuyet Mai, Vu Hai Ninh, Lai Nang Duy, Luu Van Boi, Nguyen Xuan Hoan, Pascal Carriere (2010), "Effect of Silane coupling to cure reaction of nano-BaTiO₃/Epoxy composites", *Science and Technology Journals* 48 (2A), pp. 419-424.

5. Phan Thi Tuyet Mai, Chu Ngoc Chau, Luu Van Boi, Pascal Carriere, Nguyen Xuan Hoan (2010), "Study γ -aminopropyl-trimethoxy Silane grafting reaction onto surface BaTiO₃ nanoparticles", *Chemical Journals* 48 (A), pp.13-17.

6. Phan Thi Tuyet Mai, Le Thi Hong Phong, Nguyen Minh Quan, Luu Van Boi, Pascal Carrière, Nguyen Xuan Hoan (2011), " Study BaTiO₃ nanoparticles grafted process onto the surface of glass fiber", *Chemical Journals* 49 (2ABC), pp.462-466.

7. Phan Thi Tuyet Mai, Lai Nang Duy, Le Thi Hong Phong, Chu Ngoc Chau, Luu Van Boi, Nguyen Xuan Hoan , Pham Duc Thang, Isabelle Martin, Pascal Carriere (2011), "Study on the system of BaTiO₃-Glass fiber reinforced polymer composites", *Journées Scientifiques Franco Vietnamiennes « Matériaux nanostructurés et ses Applications*, pp. 19.