VIETNAM NATIONAL UNIVERSITY, HANOI
UNIVERSITY OF ENGINEERING AND TECHNOLOGY
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INFORMATION ON DOCTORAL THESIS

1. Full name: Nguyen Thu Kim Oanh ..... 2. Sex: Female .....

3. Date of birth: 09th December 1989 ..... 4. Place of birth: Hanoi .....

5. Admission decision number: 640/QĐ-CTSV dated 03th September 2011 by Headmaster of the University of Engineering and Technology

6. Changes in academic process:

7. Official thesis title: *Studying the characteristic of an exotic phase and phase transition on a nanostructured lattices*.

8. Major: Nano materials and devices

9. Code: 944012801.QTD

10. Supervisor: Prof. Dr. Bach Thanh Cong

Dr. Dang Dinh Long

11. Summary of the new findings of the thesis:

- The first-order magnetization process with jumps of perovskite manganites is investigated using the disordered Ising model with different probabilities and magnitude of ferromagnetic and antiferromagnetic exchanges. Comparison between the theorerical and experimental magnetization curves of manganese polycrystalline perovskites such as $Pr_{0.5}Ca_{0.5}Mn_{0.95}Co_{0.05}O_3$ (magnetization curve) and $Pr_{0.5}Ca_{0.5}Mn_{0.97}Ga_{0.03}O_3$ (resistivity curve) gives satisfied results.

-The conditions and factors affecting the formation of magnetization plateau with the fractional values have been indicated in the disordered Ising model on Shastry - Sutherland lattice. We emphasize that the creation of fascinating sequences of magnetization plateaus at fractional values of the saturated magnetization originating from the presence of disorder has an intimate relationship with the ground-state phase diagram of the standard Shastry - Sutherland model.

- The possibility of the supersolid phase was found in the vicinity of crystal densities corresponding to the supersolid phase induced by vacancy and interstitial in the periodic pinning potential. This supersolid phase is emerged in both hard-core and soft-core boson model.

12. Practical applicability, if any:

- To explain the origin of magnetization steps in the first-order magnetization process of Manganese perovskite and rare earth tetraoxide RB_4.

- To show new possible ways to observe the supersolid phase in experiments of ultracold atoms on an optical lattice in the future.

13. Further research directions, if any:

Studying the ability to form and stabilize a supersolid phase in disorder Bose - Hubbard model on different geometrical lattices.

14. Thesis-related publications:

[1] Bach Huong Giang, Nguyen Thi Kim Oanh, Nguyen Van Chinh, Bach Thanh Cong (2015) "First order magnetization process in Polycrystalline Perovskite Manganite", Materials Transactions, Vol.56, No.9, p. 1320-1322.

[2] Oanh Nguyen, Long Dang (2017) "A supersolid phase of hardcore boson in square optical superlattice", The European Physical Journal B, Vol 90, No.4, p.71.

[3] Oanh K. T. Nguyen, Phong H. Nguyen, Long D. Dang, Cong T. Bach and Giang H. Bach (2020) "Fluctuation inducing fractional magnetization behavior on the Shastry-Sutherland lattice", Physica B: Condensed Matter, Volume 583, 412012.