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Letter to Editor

Orientation of solid- state physics and materials science at SPMS2023

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ABSTRACT

The SPMS2023 conference, which focused on Solid State Physics and Materials Science, took place at Ho Chi Minh City University of Technology and Education in Ho Chi Minh City, Vietnam, from November 5 to 7, 2023. The event received a substantial turnout, with more than 397 abstracts submitted by prominent experts and emerging researchers in the field. These submissions covered the latest advancements in fundamental aspects across four specialized sessions: (A) physics and magnetic materials, (B) semiconductor and dielectric physics, (C) semiconductor and dielectric materials and devices, and (D) biomedical materials, along with materials for agriculture, energy, and the environment. The conference featured a diverse program that included 36 invited presentations, 52 contributed oral reports, and 198 scientific posters, all of which were organized into the four principal themes above. Additionally, the Organizing Committee oversaw a rigorous review process for 180 full-text reports, which were subsequently submitted to the Journal of Science and Technology (Vietnam Academy of Science and Technology).

Key words: solid-state physics, materials science, SPMS, national conference

INTRODUCTION

The SPMS2023 conference, jointly organized by the Viet Nam Physical Society, the Viet Nam Materials Research Society (V-MRS), the Institute of Physics, the Institute of Materials Science (Viet Nam Academy of Science and Technology), Hanoi University of Science and Technology, Vietnam National University (VNU), PHENIKAA University, and Ho Chi Minh City University of Technology and Education, took place in Ho Chi Minh City, Viet Nam, from November 5 to 7, 2023. The conference featured 5 plenary speakers and 36 invited speakers and included more than 380 scientists (refer to **Figure 1**, **Table 1**, and **Table 2**)[1]. This year, the SPMS2023 conference attracted 380 participants from universities and research institutes, both domestically and internationally, to attend, meet, and engage in academic exchanges. Continuing the traditional international cooperation relationship between Vietnamese and Korean scientists, this year's SPMS2023 Conference is attended by scientists from the Korean Physical Society and the Korean Materials Science Society reporting presentations. In addition, many Vietnamese scientists working abroad (France, Australia, Korea, Taiwan, Singapore, *etc.*) also returned to Viet Nam to attend the SPMS2023. Since its first organization in 1995, the conference has been held 12 times and has drawn significant attention from the physics and materials science research community both nationally and internationally.

The event involved more than 380 researchers from universities and research institutes across the country and involved 12 foreign scientists. Notably, there were 52 oral presentations during plenary sessions and an additional 4 specialized sessions, complemented by 198 posters. The four specialized sessions covered diverse topics, including (A) physics and magnetic materials, (B) semiconductor and dielectric physics, (C) semiconductor and dielectric materials and devices, and (D) biomedical materials as well as materials for agriculture, energy, and the environment.

This year's conference theme focused on the role of solid-state physics and materials science in semiconductor technology in Viet Nam. Professor Nguyen Duc Chien presented this topic. In addition, the SPMS2023 conference was held on the same day as Vietnam Physics (November 6), and Prof. Nguyen Quang Liem provided a detailed presentation on the history of Physics in Vietnam. In the plenary session, Prof. Suklyun Hong, who is President of the Korean Physics Association, shared the theoretical study of two-dimensional materials and their van der Waals heterostructures. After that, Prof. Nguyen Xuan Phuc presented the heating ability of the nanomaterials and their potential application. The last talk of the plenary session was of Dr. Nguyen Thai Ngoc Uyen from the University of Natural Sciences, University of Science

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and Technology, Ho Chi Minh City National University, who introduced the latest products on bio-nanocomposite materials and their application.

There were 157 presentations related to energy and the environment compared to 297 presentations at the conference (**Figure 2**). The obtained results indicated that scientists are paying increased attention to this topic. On the other hand, energy and the environment have become hot topics. This focuses on green energy and sustainable development. The topics of lithium-ion batteries, fuel cells, CO_2 reduction, green hydrogen generation from seawater splitting, and clean water production from solar-driven water evaporation have received much attention.

During the conference, a 5^{th} committee meeting of Viet Nam University of Materials Science with more than 100 delegates was held, and 67 executive committee members, 12 members of the standing committee, including 01 president (Prof. Doan Dinh Phuong) and 06 vice presidents (Prof. Dang Mau Chien, Prof. Pham Thanh Huy, Prof. Nguyen Duc Hoa, Prof. Phan Bach Thang, Prof. Nguyen Van Dang, Prof. Nguyen Hoang Hai), were elected (**Figure 3**a). The Executive Committee is also grateful for the contributions of Professor Nguyen Duc Chien, Professor Le Quoc Minh, Professor Nguyen Hoang Luong, and Professor Pham Duc Thang. The SPMS2023 conference gave a 1-minute to commemorate Prof. Nguyen Van Hieu and organized activities to celebrate Vietnam Physics Day (November 6) (**Figure 3**b). The Vietnam-Korea Cooperation meeting was successfully organized (**Figure 3**c).

In conclusion, the discussions and poster exhibitions during SPMS2023 underscored the primary research directions within Solid-State Physics and Materials Science. These conferences have drawn significant attention from the physics and materials science research community both nationally and internationally. We look forward to seeing you at SPMS2025.

ACKNOWLEDGMENTS

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COMPETING INTERESTS

The authors declare that they have no competing interests.

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Figure 1: **(a) Photograph of invited speakers and participants at the 13th Vietnam National Conference on Solid State Physics and Materials Science 2023 (SPMS 2023); (b) Prof. Suklyun Hong giving talks at the conference; (c) The discussion in out of conference room; (d) the discussion in specialized sessions; (d) The discussion in poster section**. (The photos were taken at the conference.)

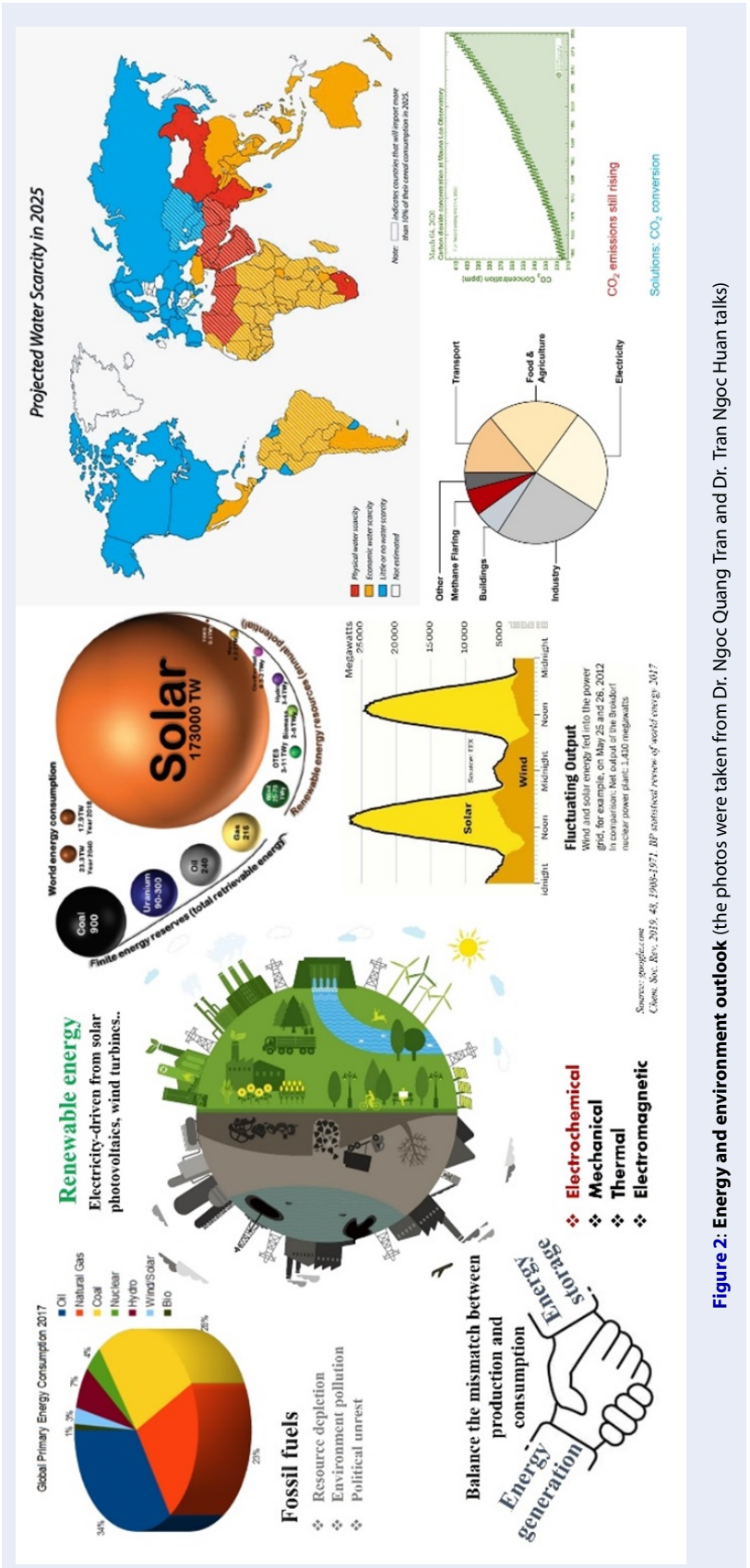

Figure 2: Energy and environment outlook (the photos were taken from Dr. Ngoc Quang Tran and Dr. Tran Ngoc Huan talks)

Figure 3: **(a) V-MRS executive committee meeting; (b) Vietnam Physics Day celebration; (c) Vietnam-Korea Cooperation Meeting.**

Table 1: Plenary talks for SPMS2023

Presenter	Title
Prof. Suklyun Hong (Sejong University, Korea)	Theoretical study of two-dimensional materials and their van der Waals heterostructures
Prof. Nguyen Xuan Phuc (Institute of Materials Science, Viet Nam Academy of Science and Technology, Viet Nam)	Electromagnetic heating using nanomaterials as susceptors and its potential applications
Prof. Nguyen Quang Liem (Viet Nam Academy of Science and Technology, Viet Nam)	A brief history of physics in Viet Nam
Prof. Nguyen Duc Chien (Ha Noi University of Science and Technology, Viet Nam)	Role of Viet Nam physical society and Viet Nam materials research society in developing semiconductor industry in Viet Nam
Dr. Nguyen Thai Ngoc Uyen (University of Natural Sciences, University of Science and Technology, Ho Chi Minh City National University, Viet Nam)	Materials science in Polymer biocomposite/nanocomposite – A trend of research and application

Table 2: Invited talks for SPMS2023

Presenter	Title	Specialized subcommittees
Prof. Sunglae Cho	Growth temperature dependent magnetic properties of Fe film on $BaTiO_3$	Physics and magnetic materials
Prof. Tran Hai Duc	Potential studies on superconductivity and its applications by using accelerator	
Prof. Pham Thanh Phong	Xác định các thông số đàn hồi và kích thước tinh thể của nano $MnFe_2O_4$ từ nhiễu xạ tia X và phổ FTIR (Determination of elastic parameters and crystal size of $MnFe_2O_4$ by X-ray diffraction and FTIR spectrum)	
Prof. Ngo Thu Huong	Ảnh hưởng của độ dày lên tính chất của vật liệu màng BFO pha tạp ion Nd^{3+} (Effect of film thickness on properties of BFO-doped Nd^{3+})	
Prof. Do Hung Manh	Khả năng sinh nhiệt của các hạt nano từ với cấu trúc lõi-vỏ $Fe_3O_4/CoFe_2O_4$ (Heat generation ability of magnetic nanoparticles with $Fe_3O_4/CoFe_2O_4$ core-shell structure)	
Dr. Tran Tuan Anh	Trật tự phản sắt từ vô ước trong vật liệu cách điện 2 chiều van der Waals bất thỏa từ yếu $CrPSe_3$ (Irregular antiferromagnetic order in 2D van der Waals insulating materials does not satisfy weak magnetism $CrPSe_3$)	
Prof. Dang Ngoc Toan	High pressure driven magnetic disorder and structural transformation in Fe_3GeTe_2: Emergence of a magnetic quantum critical point	
Prof. Tran Dang Thanh	Ảnh hưởng của Na lên chuyển pha từ của manganite $La_{0,7}Ca_{0,3}MnO_3$ (Effect of Na on the magnetic phase transition of manganite $La_{0.7}Ca_{0.3}MnO_3$)	
Prof. Yunsang Lee	Luminescent properties of rare earth ion-doped functional oxides	Semiconductor and dielectric physics
Prof. Tran Ngoc	The analyze structural and the optical properties of Ce^{3+}, Dy^{3+} ions codoped lithium-sodium aluminoborate glass	
Prof. Sang Min Won	Silicon nanomembrane for skin interfaced and implantable device	
Prof. Luc Huy Hoang	Oxygen Vacancy Formation and Enhanced Photocatalytic Activity of Bi_2WO_6 Photocatalyst	
Prof. Nguyen Ngoc Hieu	Enhanced out-of-plane piezoelectricity and carrier mobility in Janus structures based on γ-phase of group IV monochalcogenide	
Prof. Vu Thi Kim Lien	Effect of precursor and catalysts amounts on optical properties of silica nanoparticles containing CdSe/CdS quantum dots	
Prof. Phan Minh Chi	Controlling nanoparticle size by cationic surfactants	
Dr. Phan The Long	Optical and magnetic properties of transition-metal-doped ZnO nanorods prepared by thermal diffusion	

Continued on next page

Table 2 continued

Presenter	Title	Specialized subcommittees
Prof. Soon-Gil Yoon	Mechanical energy harvesting by eco-friendly heterostructures of flexoelectric Zn-Al:LDH nanosheets and piezoelectric ZnO thin films/nanorods	Materials - semiconductor components - dielectric
Prof. Shinuk Cho/Dr. Tran Hong Nhan	Annealing-free solution-processable metal oxide hole transport layer for bulk-heterojunction organic solar cells	
Prof. Sunjun Park	Skin-compatible wearable sensors via organic optoelectronic devices	
Prof. Jin Hyeok Kim	Recent progress in earth-abundant elements-based photochemical and electrochemical splitting	
Prof. Phuong V. Pham	Free-damage plasma gas sandwiched graphene for flexible display and pressure sensor	
Prof. Dao Vinh Ai	A statistical approach for the optimization of photovoltaics: Experiments & simulations	
Prof. Nguyen Tran Thuat	Perovskite hai chiều ứng dụng trong vật lý polariton tại nhiệt độ phòng và các linh kiện lượng tử cao cấp tiềm năng (2D perovskite applications in room-temperature polariton physics and potential advanced quantum devices)	
Prof. Chu Manh Hung	Synthesis of WS2 nanosheets SnO_2 nanowires heterostructure for enhanced NO_2 gas sensing performance	
Dr. Dang Vinh Quang	Modification of ZnO nanorods nanorods for visible photodetectors	
Prof. Jae Hyun Kim	Functionality of zeolite filler in composite polymer electrolytes	Biomedical materials - agriculture, energy - environment
Prof. Nguyen Van Quynh	Electrosynthesized nanostructured molecularly imprinted polymer for detecting diclofenac molecule	
Prof. Tran Duy Tap	Nghiên cứu ảnh hưởng của chiếu xạ neutron lên màng nafion sử dụng trong pin nhiên liệu (Effects of neutron irradiation on nafion membranes used in fuel cells)	
Dr. Nguyen Ngoc Duc	Kết hợp đồng thời phương pháp điện hóa với phổ tán xạ Raman cho nghiên cứu thời gian thực vật liệu xúc tác MoS_2 và $MoSe_2$ trong quá trình tạo nhiên liệu sạch hydro (Simultaneously, combining electrochemical methods with Raman scattering spectroscopy for real-time research on MoS_2 and $MoSe_2$ catalytic materials in the process of creating clean hydrogen fuel)	
Dr. Tran Ngoc Huan	Selective electroreduction of CO_2 and CO to valuable products at high current density by engineering catalysts and electrolyzer	
Dr. Nguyen Thi Quyen	Noble-metal-free iron nitride electrocatalyst for oxygen evolution reaction	

Continued on next page

Table 2 continued

Presenter	Title	Specialized subcommittees
Dr. Tran Van Tan	Cảm biến so màu tăng cường với mảng quang tử keo Ag@Fe_3O_4: nền tảng giám sát nhanh môi trường và a toàn thực phẩm tại chỗ (Colorimetric sensor enhanced with Ag@Fe3O4 colloidal photonic array: platform for rapid on-site environmental and food safety monitoring)	
Prof. Ung Thi Dieu Thuy	Synthesis, characterization and stability of water soluble $AgInSe_2$/ZnS core/shell nanocrystals	
Prof. Nguyen Viet Long	Tổng hợp, cấu trúc và tính chất một số loại nano từ ferrite bằng quy trình polyol (Synthesis, structure, and properties of some types of ferrite nanoparticles using the polyol process)	
Dr. Tran Thi Nhu Hoa	Ứng dụng "dung môi xanh" DES chế tạo hạt nano bạc nhằm mục đích phát hiện dư lượng kháng sinh (Applying DES "green solvent" to produce silver nanoparticles to detect antibiotic residues)	