Dr AHMED GALAL ABDELREHIM RASHWAN

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Postdoc Researcher, School of Mechanical Engineering, Ulsan University, South Korea
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Academic qualifications

- ***Doctor of Philosophy (PhD), Major** "Mechanical Engineering", **Specialization** "materials science and engineering", School of Mechanical Engineering, University of Ulsan, South Korea, (August 2021).*
  - ***Thesis Title:** "Mechanical Exfoliation of 2D-Materials and Formation of Nanocomposites with Transition Metal Compounds by Vacuum Kinetic Spray Process for Energy Conversion and Sensing Applications".*

- ***Master of Science (MSc), Major** "Physics", **Specialization** "Experimental Solid-State Physics", Physics Department, Faculty of Science, Assiut University, Egypt (February 2016).*
  - ***Thesis Title:** "Influence of Thermally Induced Structural and Morphological Changes, and UV Irradiation on Photoluminescence and Optical Absorption Behavior of $Zn_xCd_{1-x}S$ Nanocompounds".*

- ***Bachelor of Science (BSc), Major** "Physics", Physics Department, Faculty of Science, Assiut University, Egypt (July 2009).*

Academic appointments

- ***Postdoctoral Researcher**, School of Mechanical Engineering, University of Ulsan, South Korea (March 2024 ~ March 2026). **Research field**, "Fabrication of heterostructure electrodes with hybrid nanomaterials for energy conversion, energy storage and sensing applications "*

- ***Lecturer of Physics**, Physics Department, Faculty of Science, Assiut University, Egypt, (September 2022 ~ February 2024). During this period, I have taught many courses to undergraduate & and postgraduate students in the faculty of science and faculty of engineering at Assiut University as illustrated below:*
  - ✓ *General physics 1: (classical mechanics & heat) for 1st level undergraduate student, of biomedical engineering, faculty of engineering at Assiut University.*
  - ✓ *General physics 2: (Electricity & magnetism) for 1st level undergraduate biomedical engineering student, National Assiut University faculty, Egypt.*
  - ✓ *General physics 2: (Electricity & magnetism) for 1st level undergraduate student, faculty of science, Assiut University, Egypt.*
  - ✓ *Semiconductors and thin film applications: for 4th-level undergraduate students in the physics department, faculty of science, Assiut University, Egypt.*
  - ✓ *Magnetic Resonance: for 4th-level undergraduate students in the physics department, faculty of science, Assiut University, Egypt.*
  - ✓ *Quantum dots (QDs): as a prerequisite master course for a master's degree in nanomaterials science, physics department, faculty of science, Assiut University, Egypt.*

- ***Postdoctoral Researcher**, School of Mechanical Engineering, University of Ulsan, South Korea (September 2021 ~ August 2022). **Research field**, "Fabrication of heterostructure electrodes with hybrid nanomaterials for energy conversion, energy storage and sensing applications "*

- *Ph.D. Student, School of Mechanical Engineering, University of Ulsan, South Korea (September 2018 ~ August 2021).*

- *Assistant Lecturer, Physics Department, Faculty of Science, Assiut University, Egypt (April 2016 ~August 2018).*

- *Instructor, Physics Department, Faculty of Science, Assiut University, Egypt (May 2010 ~ January 2016).*

Professional and Research Experiences

- *Fabrication of heterostructure electrodes with various hybrid nanostructure materials for energy storage, conversion, and sensing applications.*
- *Preparation of two-dimensional (2D) materials through various physical and chemical exfoliation techniques.*
- *Chemical synthesis of various functional nanostructure metals and semiconductor materials and their alloys through multiple techniques.*
- *Performance evaluation of heterogeneous electrodes related to water-splitting energy conversion applications through an electrocatalytic or photo-electrocatalytic approach.*
- *Performance evaluation of heterogeneous electrodes related to electrochemical energy storage by the supercapacitor and metal-ion batteries.*
- *Performance evaluation of heterogeneous electrodes related to non-enzymatic electrochemical sensors.*
- *Investigation of the anticorrosion behavior of modified metal substrates by the nanosecond pulsed laser.*

Conferences

- *Nanotechnology and Nanomaterial for sustainable development, Luxor, Egypt, 2016*
- *5th international conference for a young researcher, Assiut, Egypt, 2016.*
- *4th international conference for a young researcher, Assiut, Egypt, 2014.*
- *Introduction to Nanotechnology workshop, Nano-tech for the photoelectronic company, 6-October, Egypt, 2011.*

Supervision

- **Master Thesis**," Synthesis and Study of Some Properties of $(ZnSn)_{1-x}M_xO$ Nanocomposites with M = Co, Cu and various x values ($0.00 < x < 0.5$)"; **Student |** Ahmed Abbas Ahmed, demonstrator at the Physics Department, Faculty of Science, Assiut University. **Supervisors |** Prof. Ahmed Sedky Mohamed; Prof. Dr. Nasser Mohamed Shaker Ahmed; Dr. Ahmed Galal Abdelrehim; **Approval date |** 28/05/2025.

Patent

- *Doo-Man Chun and Ahmed Galal Abdelrehim, "Manufacturing method of multi-material electrode catalyst", Ulsan University Industry-Academic Cooperation Group, Korea, Registration number. 1028209350000 (11/06/2025), Unex Publication number. 1020240043303 (03/04/2024), Publication date: 16/06/2025, https://doi.org/10.8080/1020220122213*

List of Publications:

Google Scholar: https://scholar.google.com.eg/citations?user=TwoKitsAAAAJ&hl=ar

Scopus profile: https://www.scopus.com/authid/detail.uri?authorId=57103841900

ORCID: https://orcid.org/0000-0002-8689-2294

1) ***A. G. Abd-Elrahim**, Manar A. Ali, Doo-Man Chun, Electrodeposition of a novel porous, crystalline Cd-rich CdS nanonoodles on ZnO nanosheets for enhanced solar light-driven water splitting, Journal of Power Sources, 2025, 655: p. 237950.*

2) ***A. G. Abd-Elrahim**, Manar A. Ali, Doo-Man Chun, CoS_2-reduced graphene oxide nanocomposites electrodecorated on Cu_2O nanosheets for enhanced enzyme-free glucose detection, Microchemical Journal, 2025, 212: p. 113315.*

3) ***A. G. Abd-Elrahim**, Manar A. Ali, Doo-Man Chun, Enhanced oxygen evolution using sulfate-intercalated amorphous FeNiS@FeS layered double hydroxide nanoflowers for advanced water-splitting performance, Journal of Power Sources, 2025, 635: p. 236472.*

4) ***A. G. Abd-Elrahim**, Muhammad Sheroze Malik, Manar A. Ali, Doo-Man Chun, Effect of binder-free (Ni–Co–S)–reduced graphene oxide heterostructure configurations on the pseudocapacitance behavior of MoS2 nanoflake layer for hybrid asymmetric supercapacitor, Journal of Alloys and Compounds, 2025, 1011:p. 178449.*

5) ***A. G. Abd-Elrahim**, Doo-Man Chun, E.M.M. Ibrahim, Faisal K. Algethami, Mohamed Nady Goda, Manar A. Ali, Sonochemical synthesis of mesoporous $Zn_yCd_{1-y}S$ quantum dots: Composition-dependent optical, electrical, dielectric, and hydrogen-generation characteristics, Journal of Physics and Chemistry of Solids, 2025, 197: p. 112414.*

6) ***A. G. Abd-Elrahim**, Manar A. Ali, Doo-Man Chun, Electrodeposition of CoSx-graphene nanoplatelets on $Ni(OH)_2$ nanosheets for improving the pseudocapacitance performance, Applied Surface Science, 2024, 673: p. 160903.*

7) ***A. G. Abd-Elrahim**, Deepto Roy, Muhammad Sheroze Malik, Doo-Man Chun, Low-temperature coating of Mn_2O_3–MoS_2 micro-nano-heterostructure anode as an efficient catalyst for water-splitting applications, Journal of Materials Science, 2024, 59:p. 7332-7355.*

8) *Deepto Roy, Muhammad Sheroze Malik, Doo-Man Chun, **A. G. Abd-Elrahim**, Facile one-step deposition of nanosized Ni(OH)2–MoS_2 heterostructure electrodes for efficient oxygen evolution reaction, Journal of Physics and Chemistry of Solids, 2024, 186: p. 111836*

9) *A. Sedky, N. Afify, Ahmed Abbas, and **A. G. Abd-Elrahim**, Cooperative effects due to Zn–Sn replacement by Co-ions on the optical and magnetic properties of $(ZnSn)_{1-x}Co_xO$ nanocomposites, Materials Chemistry and Physics, 2024, 313: p. 128776*

10) ***A. G. Abd-Elrahim**, A. Sedky, N. Afify, Ahmed Abbas, The effect of composition on the structure, optical, and room-temperature ferromagnetic properties of hydrothermally synthesized $(ZnSn)_{1-x}Cu_xO$ nanocomposites, Physica B: Condensed Matter, 2024. 674: p. 415568*

11) *Muhammad Sheroze Malik, Deepto Roy, Doo-Man Chun, **A. G. Abd-Elrahim**, One-Step Dry Coating of Hybrid ZnO–WO3 Nanosheet Photoanodes for Photoelectrochemical Water Splitting with Composition-Dependent Performance, Micromachines, 2023 .14: 2189.*

12) *Manar A. Ali, Doo-Man Chun, E. M. M. Ibrahim, **A. G. Abd-Elrahim,** Optical and temperature-dependent electrical and dielectric properties of ultrasound-synthesized CdS quantum dots, Physica Scripta, 2023. 98: p. 115943.*

13) ***A. G. Abd-Elrahim**, Doo-Man Chun, E. M. M. Ibrahim, Manar A. Ali, Sonochemical-assisted preparation of mesoporous ZnS quantum dots: Optical, electrical, and temperature-dependent dielectric characteristics, Physica B: Condensed Matter, 2023. 670: p. 415408*

14) *M. A. Osman, **A. G. Abd-Elrahim**, E. R. Shaaban, and Manar A. Ali, Thermal stimulated structural transformation of cubic Zn0.78Cd0.22S nanoparticles to ZnO nano-hexagons: Tailoring of optical band gap and emission spectra for optoelectronic implementations. Journal of Alloys and Compounds, 2023. 961: p. 171000*

15) *Ngoc Giang Tran, Doo-Man Chun, and **A. G. Abd-Elrahim**, Superhydrophobic aluminum surfaces with nano-micro hierarchical composite structures: A novel and sustainable approach to corrosion protection, Journal of Alloys and Compounds, 2023. 960: p. 170907*

16) ***A. G. Abd-Elrahim**, and Doo-Man Chun, Room-temperature coating of Mn3O4–2D material (graphene and MoS2) nanocomposites for improving oxygen evolution reaction kinetics.Materials Research Bulletin, 2023. 166: p. 112348.*

17) ***A. G. Abd-Elrahim***, *and Doo-Man Chun, Room-temperature fabrication of a heterostructure Cu_2O@CuO nanosheet electrocatalyst for non-enzymatic detection of glucose and H_2O_2. Journal of Electroanalystical Chemistry, 2022. 924: p. 116874*

18) ***A. G. Abd-Elrahim***, *and Doo-Man Chun, Kinetically induced one-step heterostructure formation of Co3O4-Ni (OH)2-graphene ternary nanocomposites to enhance oxygen evolution reactions. Journal of Alloys and Compounds, 2022. 906: p. 164159*

19) ***A. G. Abd-Elrahim***, *and Doo-Man Chun, One-step mechanical exfoliation and deposition of layered materials (graphite, MoS2, and BN) by vacuum-kinetic spray process, Vacuum, 2022. 196: 110732*

20) ***A. G. Abd-Elrahim***, *and Manar A. Ali, Facile synthesis of nano-sized zinc-rich ZnCdS ternary alloy and UV-irradiation curing of photoluminescence emission characteristics. Optical Materials 2021. 122: p. 111774*

21) ***A. G. Abd-Elrahim***, *and Doo-Man Chun, Heterostructured Mn_3O_4-2D material nanosheets: One-step vacuum kinetic spray deposition and non-enzymatic H_2O_2 sensing. Ceramics International, 2021. **47**(24): p. 35111-35123*

22) ***A. G. Abd-Elrahim***, *and Doo-Man Chun, Facile one-step deposition of ZnO-graphene nanosheets hybrid photoanodes for enhanced photoelectrochemical water splitting. Journal of Alloys and Compounds, 2021. 870: p. 159430.*

23) ***A. G. Abd-Elrahim***, *and Doo-Man Chun, Room-temperature deposition of ZnO-graphene nanocomposite hybrid photocatalysts for improved visible-light-driven degradation of methylene blue. Ceramics International, 2021. **47**(9): p. 12812-12825.*

24) ***A. G. Abd-Elrahim***, *and Doo-Man Chun, Nanosized Co_3O_4–MoS_2 heterostructure electrodes for improving the oxygen evolution reaction in an alkaline medium. Journal of Alloys and Compounds, 2021. **853**: p. 156946.*

25) *Mohammed, M.M.,* ***A. G. Abd-Elrahim***, *and Doo-Man Chun, One-step deposition of a $Ni(OH)_2$-graphene hybrid prepared by vacuum kinetic spray for high energy density hybrid supercapacitor. Materials Chemistry and Physics, 244, 2020: p. 122701.*

26) ***A. G. Abd-Elrahim***, *M.M. Mohammed, and Doo-Man Chun, Composition dependent electrocatalytic activity of $Ni(OH)_2$-graphene hybrid catalyst deposited by one-step vacuum kinetic spray technique. Materials Chemistry and Physics, 244, 2020: p. 122675.*

27) ***A. G. Abd-Elrahim***, *and Doo-Man Chun., Facile one-step deposition of Co_3O_4-MoS_2 nanocomposites using a vacuum kinetic spray process for non-enzymatic H_2O_2 sensing. Surfaces and Interfaces, 2020. **21**: p. 100748.*

28) ***A. G. Abd-Elrahim***, *and Doo-Man Chun, Fabrication of efficient nanostructured Co_3O_4-Graphene bifunctional catalysts: Oxygen evolution, hydrogen evolution, and H_2O_2 sensing. Ceramics International, 2020.* ***46****(15): p. 23479-23498.*

29) *A. A. Othman, M. A. Osman, and* ***A. G. Abd-Elrahim****, The effect of milling time on Structural, optical and Photoluminescence Properties of ZnO Nanocrystals. Optik-International Journal for Light and Electron Optics, 2018.* ***156****: p. 161-168.*

30) *M. A. Osman,* ***A. G. Abd-Elrahim****, and A. A. Othman, Size-dependent structural phase transitions and their correlation with photoluminescence and optical absorption behavior of annealed $Zn_{0.45}Cd_{0.55}S$ quantum dots. Materials Characterization, 2018.* ***144****: p. 247-263.*

31) *M. A. Osman, and* ***A. G. Abd-Elrahim****, Excitation Wavelength Dependent Photoluminescence Emission Behavior, UV induced Photoluminescence Enhancement and Optical Gap Tuning of $Zn_{0.45}Cd_{0.55}S$ Nanoparticles for Optoelectronic Applications. Optical Materials, 2018.* ***77****: p. 1-12*

32) *A. A. Othman, M. A. Osman, E.M.M. Ibrahim, Manar A. Ali, and* ***A. G. Abd-Elrahim****, Mn-doped ZnO nanocrystals synthesized by sonochemical method: Structural, photoluminescence, and magnetic properties. Materials Science and Engineering: B, 2017.* ***219****: p. 1-9.*

33) *M. A. Osman,* ***A. G. Abd-Elrahim****, and A. A. Othman, Identification of trapping and recombination levels, structure, morphology, photoluminescence and optical absorption behaviour of alloyed ZnxCd1−xS quantum dots. Journal of Alloys and Compounds, 2017.* ***722****: p. 344-357.*

34) *M. A. Osman, Waleed A. El-said, A. A. Othman, and* ***A. G. Abd-Elrahim****, Influence of thermally induced structural and morphological changes, and UV irradiation on photoluminescence and optical absorption behavior of CdS nanoparticles. Journal of Physics D: Applied Physics, 2016.* ***49****(16): p. 165302.*

35) *M. A. Osman, A. A. Othman, Waleed A. El-said,* ***A. G. Abd-Elrahim****, and A. A. Abu-sehly, Thermal annealing and UV irradiation effects on structure, morphology, photoluminescence and optical absorption spectra of EDTA-capped ZnS nanoparticles. Journal of Physics D: Applied Physics, 2015.* ***49****(5): p. 055304.*

36) *M. A. Osman, A. A. Othman, M. H. Wahdan,* ***A. G. Abd-Elrahim,*** *Thermal annealing and UV-induced effects on the structural and optical properties of capping free ZnS nanoparticles synthesized by co-precipitation method, (International Journal of General Engineering and Technology (IJGET), 2014, 3: p. 2278-9936.*

37) *M. A. Osman, A. A. Othman,* ***A. G. Abd-Elrahim****, Thermal Annealing induced phase transition and UV Irradiation Induced brightening in CdS nanoparticles, Nanocon international conference 2014 in Brno, Czech Republic, EU.*

38) *M. A. Osman, A. A. Othman, Waleed A. El-said,* ***A. G. Abd-Elrahim****, Structural, morphological and optical characterizations of annealed edta capped zns nanocrystals prepared by chemical precipitation method, Nanocon international conference 2014 in Brno, Czech Republic, EU.*

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