ABDELNABY M. ELSHAHAWY

Assistant Professor

+8613156020879

a.elshahaawy@science.aun.edu.eg

Xi'an, Shaanxi, China

https://scholar.google.com/citations?user=BvPn-sUAAAAJ&hl=ar&oi=ao

SUMMARYE

I obtained my PhD from National University of Singapore (NUS), Singapore; I received a Postdoc Follow at Northwestern Polytechnical University, China; and I work as assistant Professor at Assiut University, Egypt. Accomplished academic and researcher with more than 12 years of expertise in advanced materials for energy storage (supercapacitors, Zn-ion, batteries, and Li-ion/Li-S batteries) and electrocatalysis. Specialized in synthesizing functional nanomaterials (MOFs, metal sulfides/hydroxides, hydrogels, porous carbon-based materials, and 2D materials) for energy conversion/storage applications. Proven record in securing competitive grants (>3.5M LE), curriculum development, and mentoring graduate students.

WORK EXPERIENCE

Postdoctoral Fellow

Institute of Flexible Electronics, Northwestern Polytechnical University | China | 2023 – Present

- Synthesis and develop different nanomaterials with different structures and morphologies and study its validity in energy storage and conversion. Including V-MOF derived V2O3@ nitrogen doped carbon as cathode for Zn ion battery and biomass derived carbon for Zn are battery.
- Fabricate different energy storage devices for operating in extreme temperature ranges.
- Fabricate flexible and stretchable energy storage devices.

Assistant Professor

Physics Department, Assiut University | Egypt | 2019 – 2023

- Courses Taught including Superconductor Physics, General Physics I/II, Vibrations & Waves, and Materials Science Fundamentals
- Led syllabus redesign for accreditation compliance.
- Developed new lab modules on solid-state physics.
- Improved student pass rates by redesigned assessment.
- Managed 4–5 TAs for labs/grading coordination.
- Supervise master and PhD students.
- Carried out Scientific Research related to Energy Storage.

Lecturer Assistant/Demonstrator

Physics Department, Assiut University | Egypt | 2007 – 2019

- Taught practical labs: Solid-State Physics, Semiconductors, Electricity and magnetism.
- Carried out Scientific Research related to Nanomagnetic Materials and Energy Storage.

PROFESSIONAL SERVICE

• **Guest Editor:**	Frontiers in Chemistry	2021-2023
• **Council Member:**	Electricity & Energy Council, Egypt	2021-2023
• **Grant Reviewer:**	Academy of Scientific Research and Technology, Egypt	2021-2023
• **Reviewer for 15+ Journals:**	ACS Appl. Mater. Interfaces, Adv. Energy Mater., J. Mater. Chem. A	

PROJECTS

Egypt-China CERF Grant (~1,900,000 LE)

Principle Investigator (PI) | Physics Department, Assiut University | Egypt | 2022 – 2023

- Financial managing the project grant.
- Leading the Egyptian team to carry out excellent scientific Research.
- Managing the communication between Egyptian and Chinese Teams.
- Synthesizing new 2-3 low cost and environment-friendly single atom@ biomass-derived functionalized carbon catalysts with novel physical and oxygen-oxygen reduction dual function.
- Designing and preparing high performance Zn-air battery positive electrode material: oxygen oxidation (current 10mA/cm^2) overvoltage <300mV, oxygen reduction on voltage >0.91V, oxygen reduction half-wave potential>0.87V, oxygen reduction charge the number of transfers is close to or equal to 4.
- Fabricating economical and efficient flexible Zn air battery with open-circuit voltage >1.45V, cycle number >100 times, 100 times after bending, curling or twisting, capacity retention rate area >90% that is convenient with electric machines.
- Publishing papers in high-level journals.

Reintegration Grant (~1,600,000 LE)

Principle Investigator (PI) | Physics Department, Assiut University | Egypt | 2021 – 2023

- Financial managing the project grant.
- Leading the Egyptian team to carry out excellent scientific Research.
- Synthesizing, evaluating and understanding the molecular mechanisms of a protein corona consist of CWP and a novel nanocarrier Metal Organic Framework (MOF).
- Establishing a protein lab to serve a wide range of researchers interested in protein science.
- Publishing papers in high-level journals.

ScienceUp Grant (~100,000 LE)

Team Member | Physics Department, Damanhour University | Egypt | 2020 – 2021

- in-situ fabricating 2D/2D MoS_2-N-rGO and 1D/2D Bi_2S_3-N-rGO hydrogels heterostructure for Supercapacitor Application.
- Achieving outstanding Supercapacitor device with high energy and power densities.

SKILLS

- Thinking Skills
- Communication Skills
- Teaching university level Courses
- Research and Development
- Porous Materials Preparation
- Problem Solving
- Material Preparation including cathode and anode materials, carbon-based materials
- Material Characterization
- Energy Storage Device developments (Supercapacitors and Batteries)

EDUCATION

- **Name of School:** National University of Singapore

  Degree: PhD (Materials Science and Engineering)

  Year Earned: 2018

  City, Country: Singapore, Singapore

  Objective:
  - Synthesis and develop different types of metal organic framework with different structures and morphologies and study its validity in energy storage and energy conversion.
  - Synthesis of Metal sulfide and study the influence of sulfurization process on their morphologies and supercapacitor performance.
  - Synthesis of Metal hydroxide using Microwave hydrothermal method and study their supercapacitor performance.
  - Synthesis of MOF derived porous carbon as an anode for supercapacitor.
  - Synthesis of Nitrogen doped reduced graphene oxide as an anode for supercapacitor.

- **Name of School:** Assiut University

  Degree: MSc (nanomaterials)

  Year Earned: 2013

  City, Country: Assiut, Egypt

  Objective:
  - Synthesis ferrite nanoparticles using Microwave combustion techniques and study their magnetic properties.

- **Name of School:** Assiut University

  Degree: Bachelor (Physics, Distinction Grade with Honors)

  Year Earned: 2007

  City, Country: Assiut, Egypt

AWARDS

SINGA Scholarship

National University of Singapore | Singapore | 2014

ICNHBAS Conference Best Paper Award

ICNHBAS | Egypt | 2013

PUBLICATIONS

H-index: 21 (google scholar)

- **Energy Storage and Electrocatalysis Applications**

1. **Elshahawy, A. M.**, Gao, Y., Zhao, W., Li, J., Jipeng, C., Liu, X., 'In-situ modulating S- and N- rich solid electrolyte interphase for Highly Reversible Zinc Anode', (**Submitted).**

2. **Elshahawy, A. M.**, Gao, Y., Jipeng, C., Liu, X., 'Hygroscopic V-MOF Layer Enabling Stable Zn-Ion Batteries Under Fast and Deep Charging/Discharging', **Advanced Energy Materials,** 2025, e05767**.**

3. **Elshahawy, A. M.**, Gao, Y., Zhao, W., Li, J., Zhang, H., Liu, X., 'Hygroscopic Organic Complex Mutated Helmholtz Plane of Zn Anode for Outstanding Zinc Ion Battery', **Energy & Environmental Materials,** 2025, e70151

4. **Elshahawy, A. M.**, Elkatlawy, S. M., Shalaby, M. S., Guan, C., and Wang, J., 'Surface Engineered TiO_2 for high performance flexible supercapacitor applications', **Journal of Electronic materials**, Vol. 52, 2022, pp. 1347–1356.

5. **Elshahawy, A. M.**, Guan, C., Zang, W., Ding, S., Kou, Z., Pennycook, S. J., Yan, N., and Wang, J., ''Phospho-oxynitride Layer Protected Cobalt Phosphonitride Nanowire Arrays for High-Rate and Stable Supercapacitors''. **ACS applied Energy materials**., Vol. 2, no. 1, 2019, pp. 616-626.

6. **Elshahawy, A.M.**, Guan, C., Li, X., Zhang, H., Hu, Y., Wu, H., Pennycook, S.J. and Wang, J., "Sulfur-doped cobalt phosphide nanotube arrays for highly stable hybrid supercapacitor". **Nano Energy**, Vol. 39, 2017, pp.162-171.

7. **Elshahawy, A. M.**, Li, X., Zhang, H., Hu, Y., Ho, K. H., Guan, C. and Wang, J., "Controllable $MnCo_2S_4$ nanostructures for high performance hybrid supercapacitors", **Journal Materials Chemistry A**, Vol. 5, no. 16, 2017, pp.7494-7506.

8. **Elshahawy, A. M.**, Ho, K. H., Hu, Y., Fan, Z., and Wang, J., "Microwave – assisted hydrothermal synthesis of nanocrystal β-$Ni(OH)_2$ for supercapacitor applications", **CrystEngComm**, Vol. 18, no. 18, 2016, pp.3256-3264.

9. Elkatlawy, S. M., Sakr, A. A., Wang J., and **Elshahawy, A. M.**, 'Constructive Electroactive 2D/2D MoS_2-N-rGO and 1D/2D Bi_2S_3-N-rGO Heterostructure for Excellent Mo-Bi Supercapattery Applications', **Journal of Inorganic and Organometallic Polymers and Materials**, 2023, pp. 1-14**.**
10. Gamal H., **Elshahawy, A. M.**, Medany S. S., Hefnawy M. A., Shalaby M.S., 'Recent advances of vanadium oxides and their derivatives in supercapacitor applications: A comprehensive review', **Journal of Energy Storage**, 2024, 76, 109788.

11. Mahmoud, M. H., **Elshahawy, A M.**, Taha, T. A., 'Lithium Dopant Assisted Surface Modification Zn-Ferrites for High Performance Supercapacitor applications', **Journal of energy storage**, 2023, 68, 107881.

12. Li, X., **Elshahawy, A. M.**, Guan, C. and Wang, J., Metal Phosphides and Phosphates-based Electrodes for Electrochemical Supercapacitors, **small**, Vol. 13, no. 39, 2017, pp.1701530-1701554

13. La, S., Gao, Y., Cao, Q., Chen, J., **Elshahawy, A. M.**, Cui, Y., Bu, F., Makhlouf, S.A., Chee, P. S., Guan, C., 'Thermal Transfer-enhanced Zinc Anode for Stable and High-energy-density Zinc-ion Batteries', **Matter,** 2025, 8, 102013**.**

14. Zhao, W., Chen, J., Liu, X., Gao, Y., Pu, J., Cao, Q., Meng, T., **Elshahawy, A. M.**, Makhlouf, S. A., Guan, C., 'Prokaryote-inspired and Derived Oxygen Reduction Electrocatalysts for Ultra-long-life Zn-air Batteries', **Advanced Energy Materials,** 2025, ,2405594

15. Zhang, H., Ma, F, Meng, T., Geng, Z., Zhao, W., Zhu, H., Li, J., Wang, X., Wu, P., **Elshahawy, A. M.**; Gao, Q., Che, Q., 'Photo-motivated Heterojunctions Coupling Built-in Electric Field Stimulating Sulfur Redox Kinetics for Lithium-Sulfur Batteries', **Chemical Engineering Journal, 2025, 506, 160356.**

16. Cao, Q., Gao, Y., Pu, J., **Elshahawy, A. M.**, and Guan, C., 'Materials and structural design for preferable Zn deposition behavior toward stable Zn anodes', **SmartMat**, 2024, pp. e1194.

17. Du, J., Fu, G., Xu, X., **Elshahawy, A. M.**, and Guan, C., '3D Printed Graphene-Based Metamaterials: Guesting Multi-Functionality in One Gain', **Small**, 2023, pp. 2207833

18. Ke, Q., Zhang, X., Zang, W., **Elshahawy, A M.**, Hu, Y., He, Q., Pennycook, S. J., Cai, Y., Wang, and Wang, J., 'Strong Charge Transfer at 2H–1T Phase Boundary of MoS2 for Superb High-Performance Energy Storage'. **Small**, Vol. 15, no., 21, 2019, pp. 1900131-1900142.

19. Ravi, S. K., Rawding, P., **Elshahawy, A. M.**, Huang,K., Sun , W., Zhao, F., Wang .J., Jones, M., and Tan S. C., '' Photosynthetic apparatus of Rhodobacter sphaeroides exhibits prolonged charge storage''**.** **Nature Communications**, Vol. 10, no. 1, 2019, pp. 1-10

20. Li, X., Wu, H., Guan, C., **Elshahawy, A. M.**, Dong, Y., Pennycook, S. J., and Wang, J.,'' (Ni,Co)Se_2/NiCo-LDH Core/Shell Structural Electrode with the Cactus-Like (Ni,Co)Se_2 Core for Asymmetric Supercapacitors''. **Small**, Vol. 15, no.3, 2019, pp. 1803895-1803905.

21. Liu, X., Zang, W., Guan, C., Zhang, L., Qian, Y., **Elshahawy, A. M.**, Zhao, D., Pennycook, S. J., and Wang, J., Ni-Doped Cobalt–Cobalt Nitride Heterostructure Arrays for High-Power Supercapacitors, **ACS Energy Letter**, Vol. 3, no. 10, 2018, pp. 2462-2469.

22. Li, X., Wu, H., **Elshahawy, A. M.**, Wang, L., Pennycook, S. J., Guan, C., and Wang, J., "Cactus-Like NiCoP/NiCo-OH 3D Architecture with Tunable Composition for High-Performance Electrochemical Capacitors", **Advanced Functional Materials**, Vol. 28, no. 20, 2018, pp.1800036-1800046

23. Guan, C., Liu, X., **Elshahawy, A. M.**, Zhang, H., Wu, H., Pennycook, S. J. and Wang, J., Metal–organic framework derived hollow CoS_2 nanotube arrays: an efficient bifunctional electrocatalyst for overall water splitting, **Nanoscale horizons**, Vol.2, no. 6, 2017, pp.342-348

24. Ma, Y., He, J., Kou, Z., **Elshahawy, A. M.**, Hu, Y., Guan, C., Li, X., and Wang, J., MOF-Derived Vertically Aligned Mesoporous Co_3O_4 Nanowires for Ultrahigh Capacity Lithium-Ion Batteries Anodes, **Advanced Materials Interfaces**, Vol. 5, no. 14, 2018, pp.1800222-1800228

25. Liu, X., Guan, C., Hu, Y., Zhang, L., **Elshahawy, A. M.**, and Wang, J., 2D Metal–Organic Frameworks Derived Nanocarbon Arrays for Substrate Enhancement in Flexible Supercapacitors, **Small**, Vol. 14, no. 43, 2017, pp.1702641-1702647

26. Kou, Z., Wang, T., Cai, Y., Guan, C., Pu, Z., Zhu, C., Hu, Y., **Elshahawy, A. M.**, and Wang, J., and S. Mu, Ultrafine Molybdenum Carbide Nanocrystals Confined in Carbon Foams via a Colloid-Confinement Route for Efficient Hydrogen Production, **Small** Methods, Vol. 2, no. 4, 2018, pp.1700396-1700402

- **Biomedical Applications**

1. Ibrahim, A., Hassanein, K. M. A., **Elshahawy, A. M.**, 'Burn model amelioration for developing consistent second and third-degree burn injuries in rats', **BMC Research Notes,** 2025, 18, 179.

2. Ibrahim, A., Hassanein, K. M. A., Hussein, S. I. Z., Semieka, M. M. A., **Elshahawy, A. M.**, 'Evaluation of the titanium oxide/graphene oxide/chitosan/PVA hydrogel for bone defect reconstruction in a dog model', **Journal of Materials Chemistry B**, **2025,** 13, 3581-3592

3. Tawfiq, F. M., Abd El, F.A ., Salem, S. H., **Elshahawy, A. M.**, Sayed, A. M., Abdel-Hafez, A.A., 'Enhanced biological activity of chitinase immobilized on cobalt metal-organic framework: Isolation, characterization, and potential applications', **International Journal of Biological Macromolecules**, 2025, 308, 142-538

4. Ibrahim, A., Fahmy, H. M., Mahmoud, G. A., and **Elshahawy, A. M.**, 'New strategies for sterilization and preservation of fresh fish skin grafts', **Scientific Reports,** 2024, 1, 1253

5. **Elshahawy, A. M.**, Shalaby, M. S., Rashad, M, Taha, E. O., Mahmoud, G. A., 'Magnetic Properties and Antipathogenic Bacterial Activities of Cerium doped Manganese Nano Ferrites', **Inorganic Chemistry Communications**, 2024,163, 112283.

6. Abd-El Azeem, R. M., Ibrahim, A., Kotob, M. H., **Elshahawy, A. M.**, Selim, S. M., 'Evaluation of the healing of wounds dressed with zinc metal-organic frameworks (zn-mofs) in dogs: an experimental study', **Assiut Veterinary Medical Journal**, Vol. 68, no. 175 , 2023, pp. 139-159.

7. Saad, E., Hamed, M., **Elshahawy, A. M.**, Abd El-Aal, M., Sayed, A. H., 'Effects of major and trace elements from the El Kahfa ring complex on fish: geological, physicochemical, and biological approaches', **Frontiers Environmental Science**, Vol. 10, 2022.

8. **Elshahawy, A. M.**, Abd-Elmonsef, G. M., Mokhtar, D. M., Ibrahim A., 'The optimal concentration of silver nanoparticles in sterilizing fish skin grafts', **Scientific Report**, Vol. 12, no.1, 2022, pp. 19483.

- **Water Applications**

1. Gu, Q., Ng, T. C. A., Sunc, Q., **Elshahawy, A. M.**, Lyu, Z., He, Z., Zhang, L., Ng, H. Y., Zeng, K., and Wang, J., '' Heterogeneous ZIF-L membranes with improved hydrophilicity and anti-bacterial adhesion for potential application in water treatment''. **RSC Advances**, Vol. 9, no.3, 2019, pp. 1591-1601

- **Nano magnetism Applications**

1. **Elshahawy, A. M.**, and Makhlouf, S. A., Structural and Magnetization Studies of Cobalt Ferrite Nanoparticles Synthesized by the Microwave-Combustion Method, **Current Analytical Chemistry**, Vol. 14, no. 6, 2018, pp. 641-645

2. **Elshahawy, A.M.**, Mahmoud, M.H., Makhloufa, S. A., and Hamdeh, H. H., "Role of Cu^{2+} substitution on the structural and magnetic properties of Ni-ferrite nanoparticles synthesized by the microwave-combustion method" **Ceramics International**, Vol. 41, no. 9, 2015, pp.11264–11271

3. **Elshahawy, A. M.**, Mahmoud, M. H., and Makhlouf, S. A., Magnetization Studies of Ni-Cu Ferrite Nanoparticles Synthesized by the Microwave-Combustion Method, **Journal of the Japan Society of Powder and Powder Metallurgy**, Vol. 61, no. S1, 2015, pp. S218-S220.

4. Mahmoud, M. H., **Elshahawy, A. M.**, Makhlouf, S. A., H. and Hamdeh, H. H., Synthesis of highly ordered 30 nm $NiFe_2O_4$ particles by the microwave-combustion method, **Journal of magnetism and magnetic materials**, Vol. 369, 2014, pp.55–61

5. Mahmoud, M. H., **Elshahawy, A. M.**, Makhlouf, S. A., and Hamdeh, H. H., Mossbauer and magnetization studies of nickel ferrite nanoparticles synthesized by the microwave-combustion method, **Journal of magnetism and magnetic materials**, Vol. 343, 2013, pp. 21–26

- **Nanomaterials**

1. Shalaby M. S., **Elshahawy, A. M.**, Yousif, N. M., El Agammy, E. T., Elmosalami, T. A., and Hasaneen, M. F., 'The Co-precipitated preparation, characterization, and optical investigations of Cu-doped CdO nanomaterials'. **Physica Scripta**, Vol. 97, no. 5, 2022, pp. 055805

REFEREES

- **Prof. Salah Makhlouf**
  Professor, Assiut University
  smakhlouf@gmail.com | +201007644048

- **Prof. Guan Cao**
  Professor, Northwestern Polytechnical University
  iamcguan@nwpu.edu.cn| +8615527584613

- **Prof. Ximeng Liu**
  Professor, Northwestern Polytechnical University
  ifexmliu@nwpu.edu.cn| +8619866626154

- **Prof. Sai Kishore Ravi**
  Asst. Professor, City University of Hong Kong
  skravi@cityu.edu.hk | +85234426702