



**Mohamed Esmat, PhD**

**Curriculum vitae (CV)**

**Current position:** Postdoctoral researcher at the National Institute for Materials Science (NIMS), Japan

**CONTACT INFORMATION**

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**Date of birth** 01 May 1990  
**Nationality** Egyptian  
**Gender** Male  
**Current Address** 305-0044 Ibaraki, 1-1 Namiki, NIMS, Tsukuba, Japan  
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**EDUCATION**

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**PhD**, Materials Science and Engineering, The University of Tsukuba, Japan 2019 – 2022  
**MSc**, Materials Science and Nanotechnology, Beni-Suef University, Egypt 2013 - 2017  
**BSc**, Chemistry (Excellent with honor degree), Minia University, Egypt 2007 - 2011

**WORK EXPERIENCE**

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**Postdoc. researcher**, National Institute for Materials Science, Japan 04.2022 – present  
**Junior researcher**, National Institute for Materials Science, Japan 04.2019 – 03.2022  
**Research assistant**, National Institute for Materials Science, Japan 10.2018 - 12.2018  
**Teaching assistant**, Beni-Suef University, Egypt 09.2013 - 03-2018  
**Research assistant**, Advance Materials Division, CMRDI, Egypt 07.2012 – 08.2013

**Awards**

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**Top PhD graduate**

The University of Tsukuba selected me to deliver the commencement speech on behalf of the graduation class of 2022.

## RESEARCH INTERESTS

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### Nanomaterial's chemistry and photocatalysis

I am interested in developing new layered materials and investigating their photocatalytic performance for addressing energy and environmental problems (i.e., hydrogen production, fine chemical synthesis, and water purification).

## EXPERIENCES

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- Nanomaterial's preparation methods (e.g., Ultrasonic, Chemical vapor deposition (CVD) system, Microwave reactor, Hydrothermal reactor, Ball milling, and other chemical methods)
- Materials characterization techniques (i.e., XRD, FTIR, Raman, SEM, TEM, BET, ESR, PL, and UV-vis spectra)
- Low-dimensional TiO<sub>2</sub>-based materials and their photocatalytic applications
- Synthesis and modification of 2D materials (i.e., layered titanate)
- Photocatalytic water splitting and photoreduction of metal ions
- Water purification
- Synthesis of several nanomaterials (i.e., titanate nanotubes, cobalt ferrite nanoparticles, graphene oxide (GO), graphene, and carbon nanotubes (CNTs))
- Preparation of polyaniline nanofibers and nanotubes by simple chemical methods.

## CONFERENCE ACTIVITY

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Participated in the following conferences:

1. Barcelona-Grenoble-Tsukuba "Clustering and Global Challenges" (CGC2021), April 07-09, 2021, online (**Oral**)
2. MANA International Symposium 2021, March 02-03, 2021, NIMS, Japan, online (**Poster**)
3. 2nd International Symposium on Chemistry of Materials, March 28-29, 2019, NIMS, Japan (**Poster**)
4. 13th International Conference on Chemistry and Its Role in Development, March 20-24, 2017, Sharm El Sheikh, Egypt (**Poster**)
5. 3rd Edition Nanotech Dubai 2016 Conference and Exhibition (Nanotech Dubai 2016), Dec 05 - 07, 2016 - Dubai, United Arab Emirates (**Poster**)
6. The 1st International Conference of Environmental Security and Global Climate Change (ESGCC-1), April 10-12, 2016, PSAS, BSU, Egypt (**Attendance**).

Selected to be one of the organizing committees of:

1. 2nd international conference on Advanced, Basic and Applied Sciences (ABAS-II) 2014, Ain Sokhna, Egypt
2. The 3rd International Conference (ICAAS-III), Nov. 17-20, 2015, Hurghada, Egypt
3. The Fourth International Conference on Advanced Sciences (ICAS4), November 7-10, 2017, Hurghada, Egypt.

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4. “**Nanobiotechnology training course**” held from 3rd to 5th March 2015 at PSAS, BSU, Egypt
  5. “**Scientific writing**” workshop held on 28th March 2015 at PSAS, BSU, Egypt
  6. 1st International workshop on “**Recent advances in nanomaterials**”, Nov. 21-22, 2015, PSAS, BSU, Egypt.

### **FUNDED PROJECTS**

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1. PI of the project entitled “Preparation and characterization of Functionalized Polymer Nanostructures for Heavy Metals Removal from Polluted Water”, including short-term travel to National Institute for Materials Science (NIMS), Japan, Funded by STDF, Egypt (2017).
2. A member in a project entitled “Synthesis of innovative hollow fibers polymer nanocomposite for selective removal of arsenic from drinking and groundwater” Funded by STDF, Egypt (2015).

### **JOURNAL REVIEW AND EDITORIAL SERVICE**

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<b>Reviewer</b>	- Applied Catalysis B: Environmental
	- ACS Applied Materials & Interfaces
	- ACS Applied Nano Materials
	- Arabian Journal of Chemistry
	- Energy Conversion and Management

### **LIST of PUBLICATIONS**

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**(1) Esmat, M.;** Doustkhah, E.; Abdelbar, M; El-Hosainy, H.; Tahawy, R.; Abdelhameed, M.; Ide, Y; Fukata, N. Structural conversion of Cu-titanate into photoactive plasmonic Cu-TiO<sub>2</sub> for H<sub>2</sub> generation in visible light. *ACS Sustainable Chem. Eng.* 2022, 10, 13, 4143–4151.

**(2) Esmat, M.;** El-Hosainy, H.; Tahawy, R.; Jevasuwan, W.; Tsunoji, N.; Fukata, N.; Ide, Y. Nitrogen Doping-Mediated Oxygen Vacancies Enhancing Co-Catalyst-Free Solar Photocatalytic H<sub>2</sub> Production Activity in Anatase TiO<sub>2</sub> Nanosheet Assembly. *Applied Catalysis B: Environmental* 2021, 285, 119755.

**(3) Esmat, M.;** Mohtasham, H.; Gadelhak, Y.; Mehrebani, R. T.; Tahawy, R.; Rostamnia, S.; Fukata, N.; Khaksar, S.; Doustkhah, E. 2D Mesoporous Channels of PMO; a Platform for Cluster-like Pt Synthesis and Catalytic Activity in Nitrophenol Reduction. *Catalysts* 2020, 10 (2).

**(4) Esmat, M.;** Farghali, A. A.; El-Dek, S. I.; Khedr, M. H.; Yamauchi, Y.; Bando, Y.; Fukata, N.; Ide, Y. Conversion of a 2D Lepidocrocite-Type Layered Titanate into Its 1D Nanowire Form

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with Enhancement of Cation Exchange and Photocatalytic Performance. *Inorganic Chemistry* 2019, 58 (12), 7989–7996.

(5) **Esmat M.**, Farghali A.A., Khedr M.H., El-Sherbiny I.M., Alginate-based nanocomposites for efficient removal of heavy metal ions, *Int. J. Biol. Macromol.* 102 (2017) 272–283.

(6) Doustkhah, E., **Esmat, M.**, Fukata, N., Ide, Y., Hanaor, D. A., & Assadi, M. H. N. MOF-derived nanocrystalline ZnO with controlled orientation and photocatalytic activity. *Chemosphere* 2022, 303, 134932.

(7) El-Hosainy, H., Mine, S., Toyao, T., Shimizu, K. I., Tsunoji, N., **Esmat, M.**, ... & Ide, Y. Layered silicate stabilises diiron to mimic UV-shielding TiO<sub>2</sub> nanoparticle. *Materials Today Nano* 2022, 19, 100227.

(8) Abdelhameed, M., Abdelbar, M. F., **Esmat, M.**, Jevasuwan, W., & Fukata, N. Hole-injection role of solution-processed thermally treated VO<sub>x</sub> thin films in Si nanowire-based solar cells. *Nano Energy* 2022, 107373.

(9) Hassandoost, R., Kotb, A., Movafagh, Z., **Esmat, M.**, Guegan, R., Endo, S., Jevasuwan, W., Fukata, N., Sugahara, Y., Khataee, A. and Yamauchi, Y. Nanoarchitecturing Bimetallic Manganese Cobaltite Spinels for Sonocatalytic Degradation of Oxytetracycline. *Chemical Engineering Journal* 2022, 133851.

(10) Iqbal, M.F., Yang, Y., Hassan, M.U., Zhang, X., Li, G., Hui, K.N., **Esmat, M.** and Zhang, M., Polyaniline grafted mesoporous zinc sulfide nanoparticles for hydrogen evolution reaction. *International Journal of Hydrogen Energy*, 2022, 47 (9) 6067-6077.

(11) Doustkhah, E.; Assadi, M. H. N.; Komaguchi, K.; Tsunoji, N.; **Esmat, M.**; Fukata, N.; Tomita, O.; Abe, R.; Ohtani, B.; Ide, Y. In Situ Blue Titania via Band Shape Engineering for Exceptional Solar H<sub>2</sub> Production in Rutile TiO<sub>2</sub>. *Applied Catalysis B: Environmental* 2021, 297, 120380.

(12) Abdelbar, M. F.; Abdelhameed, M.; **Esmat, M.**; El-Kemary, M.; Fukata, N. Energy Management in Hybrid Organic-Silicon Nanostructured Solar Cells by Downshifting Using CdZnS/ZnS and CdZnSe/ZnS Quantum Dots. *Nano Energy* 2021, 89.

(13) El-Hosainy, H.; Tahawy, R.; **Esmat, M.**; El-Kemary, M.; Ide, Y. Immobilization of Iron Minerals on a Layered Silicate for Enhancing Its Solar Photocatalytic Activity toward H<sub>2</sub> Production. *Frontiers in Energy Research* 2021, 9.

(14) Tahawy, R.; Doustkhah, E.; Abdel-Aal, E. S. A.; **Esmat, M.**; Farghaly, F. E.; El-Hosainy, H.; Tsunoji, N.; El-Hosiny, F. I.; Yamauchi, Y.; Assadi, M. H. N.; Ide, Y. Exceptionally Stable Green Rust, a Mixed-Valent Iron-Layered Double Hydroxide, as an Efficient Solar Photocatalyst for H<sub>2</sub> Production from Ammonia Borane. *Applied Catalysis B: Environmental* 2021, 286, 119854.

(15) Torad, N.L., El-Hosainy, H., **Esmat, M.**, El-Kelany, K.E., Tahawy, R., Na, J., Ide, Y., Fukata, N., Chaikittisilp, W., Hill, J.P. and Zhang, X. Phenyl-Modified Carbon Nitride Quantum

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Nanoflakes for Ultra-Highly Selective Sensing of Formic Acid: A Combined Experimental by QCM and Density Functional Theory Study. *ACS Applied Materials & Interfaces* 2021, 13(41), 48595-48610.

**(16)** Abdelaal, H. M.; Shaikjee, A.; **Esmat, M.** High Performing Photocatalytic ZnO Hollow Sub-Micro-Spheres Fabricated by Microwave Induced Self-Assembly Approach. *Ceramics International* 2020, 46 (12), 19815–19821.

**(17)** Doustkhah, E.; Najafi Zare, R.; Yamauchi, Y.; Taheri-Kafrani, A.; Mohtasham, H.; **Esmat, M.**; Ide, Y.; Fukata, N.; Rostamnia, S.; Sadeghi, M. H.; Assadi, M. H. N. Template-Oriented Synthesis of Hydroxyapatite Nanoplates for 3D Bone Printing. *Journal of Materials Chemistry B* 2019, 7 (45), 7228–7234.

**(18)** Zaki A.H., El-Shafey A., Moatmed S.M., Abdelhay R.A., Rashdan E.F., Saleh R.M., Abd-El Fatah M., Tawfik M.M., **Esmat M.**, El-dek S.I., Morphology transformation from titanate nanotubes to TiO<sub>2</sub> microspheres, *Mater. Sci. Semicond. Process.* 75 (2018) 10–17.

**(19)** Ewais E.M.M., El-Amir A.A.M., Besisa D.H.A., **Esmat M.**, El-Anadouli B.E.H., Synthesis of nanocrystalline MgO/MgAl<sub>2</sub>O<sub>4</sub> spinel powders from industrial wastes, *J. Alloys Compd.* 691 (2017) 822–833.

**(20)** Tawfik W.Z., **Esmat M.**, El-Dek S.I., Drastic improvement in magnetization of CdO nanoparticles by Fe doping, *Appl. Nanosci.* 7 (2017) 863–870.