

## **MD. KAMAL HOSSAIN (11.12.1980)**

Bangladesh Council of Scientific and Industrial Research (BCSIR) Laboratories, Dhaka

Dr. Quadrat-i- Khuda Road, Dhanmondi, Dhaka-1205, Bangladesh.

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<https://scholar.google.com/citations?user=3ePhEGMAAAAJ&hl=en>

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### **Research Interest**

Climate change, marine pollution, inorganic chemistry, nanomaterials, mesoporous materials, catalysis, CO<sub>2</sub> reduction/capture, material science, environmental chemistry, waste water treatment, solar cells and lithium ion battery.

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### **Education**

Ph.D. (Chemistry)

Korea Center for Artificial photosynthesis,

Department of Chemistry,

**Sogang University, Seoul, South Korea,**

March 2010- February 2015.

**Ph.D. Dissertation Title**-Order Uniformly Crystalline Mesoporous TiO<sub>2</sub> Polymorphs and Periodic Mesoporous Organosilicas: Novel Synthesis, Characterization and Photocatalytic Activity.

**Supervisor: Prof. Kyung Byung Yoon ( KB Yoon)**

Master of Science in Soil, Water and Environment (2005),

**University of Dhaka, Dhaka, Bangladesh.**

Bachelor of Science in Soil, Water and Environment (2003),

**University of Dhaka, Dhaka, Bangladesh.**

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### **Career**

**Principal Scientific Officer**

Bangladesh Council of Scientific and Industrial Research (BCSIR),

Ministry of Science and Technology, Republic of Bangladesh

**December 2019- to-day**

**Senior Scientific Officer**

Bangladesh Council of Scientific and Industrial Research (BCSIR),

**August 2011 – December 2019**

**Scientific Officer**

Bangladesh Council of Scientific and Industrial Research (BCSIR),

**June 2006- August, 2011**

**Visiting Scientist**

**Commonwealth Scientific and Industrial Research Organization (CSIRO)**

**Melbourne Australia**

Department of Mineral Resources

From August 2019-November 2019.

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**Member, Independent Monitoring Group (IMG), Air quality monitor  
Dhaka Mass Transit Company Limited (DMTCL), Government Owned Company**  
From Dece-2018 to December 2022.

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## **Research Experience**

### **i. Bangladesh Council of Scientific and Industrial Research, Dhaka, Bangladesh**

March-2015- present

- Soil biological and chemical remediation technology
  - Marine pollution and base line Studies of major estuary in Bangladesh
  - EIA, health exposure of toxic metals and ambient air quality monitoring
  - Large scale method developed for synthesise of TiO<sub>2</sub>B nanoparticles
  - Photo catalytic water treatment technology
  - Protocol developed for heavy metal analysis of soil, fertilizer, pesticides and various water samples.
  - Research going on arsenic detection kit from soil and ground water.
  - Industrial support for air quality measurement in house and ambient air quality and IEE and EIA of various industries and Dhaka Mass Rapid Transport project.
  - Various R & D work.
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## **Research Experience**

### **ii. Sogang University, Seoul, South Korea**

Graduate Researcher, Advisor: Prof. Kyung Byung Yoon (KB Yoon).

March 2010- February 2015

- Synthesize highly crystalline mesoporous metastable TiO<sub>2</sub>-B (Bronze) Polymorph, first time in history and detailed characterization and photocatalytic activity
  - Synthesize highly periodic mesoporous organosilicas, denoted as Sogang Mesoporos Silicas (SMS-1 and SMS-2), with microscopic structural analysis using HR-TEM and breaking the conventional synthesise route.
  - Synthesize various porous Nano structures of silicias and non - silicias semiconducting materials and its application on LIB, water reduction and waste water purification and dye degradation.
  - Developed new method of crystallization technique of various nanostructures.
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## **Relevant Skills**

### **Synthetic techniques**

- MOFs synthesis, hydrothermal synthesis of zeolite X and Y, copper and titanium di oxide nano-rod synthesis.
- Indoor and ambient industrial air quality monitoring and IEE and EIA reports.
- High temperature calcinations under oxygen, ozone treatment, silica nano-bead mono-layer preparation, spin coating and doctor blade technique, large scale TiO<sub>2</sub>B, Cu<sub>2</sub>O and other nanostructure synthesis.

### **Analytical/spectroscopic techniques**

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Operating experience of ICPMS,SEM, FIB, EDX, HRTEM, PXRD, SAXS, FTIR, TGA, Nitrogen adsorption-desorption isotherm, BET, solid and liquid UV-NIR, solar Simulator, xenon lamp AAS, XPS and IC.

### **Professional Member**

INGSA-Executive member

ACS member ID **32624699**

Chinese Chemical Society (CCS) member ID 210810061

Member-All Energy, Australia

Member –BCSIR SA

Member-Bangladesh Academy of Science

Life Member-DU Ex Soil Science Society of Bangladesh

Life Member-DU Registered Graduate, LM-DU Ex-student Association)

### **Reviewer**

Journal of Envoy. Sci. and Poll. Res., Nature Scientific Report, Biological Trace Element Research, Environmental Geochemistry and Health, Arabia journal of Geoscience, MDPI( Biology, Sustainability, Land), and BJSIR

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## **Publications**

### **Paper**

- Parvin, A.; **Hossain, M.K.**; Parvin, A.;Suchi,P.D.:. Trace metal exposure and human health consequences through consumption of market-available Oreochromis niloticus (L.) in Bangladesh. *Environmental Science and Pollution Research* (2023) <https://doi.org/10.1007/s11356-023-25414-w>
  - Parvin, A.; Moniruzzaman, M.; **Hossain, M.K.**; Saha, B.; Parvin, A.;Suchi,P.D.;Hoque,H. Chemical Speciation and Potential Mobility of Heavy Metals in Organic Matter Amended Soil. *Applied and Environmental Soil Science*. <https://doi.org/10.1155/2022/2028860>
  - HossainaM.B.;Rahman,M.A.; **Hossain, M.K.**; Nur, A.; Sultan, S.;Semme, ;Albeshr,F.A.;Arai, T.; Yu,J. Contamination status and associated ecological risk assessment of heavy metals in different wetland sediments from an urbanized estuarine ecosystem. *Marine Pollution Bulletin*. <https://doi.org/10.1016/j.marpolbul.2022.114246>
  - Mohiuddin, M.; Hossain, M.B.; Ali, M.M.; **Hossain, M.K.**;Habib, A.; Semme, A.A.; Rakib, MR.; Rahman, M.A.; , J.; Yu, J.; Al-Sadoon, M.K.; Gulnaz,A.; Arai,T. Human health risk assessment for exposure to heavy metals in finfish and shellfish from a tropical estuary. *Journal of King Saud University – Science*. <https://doi.org/10.1016/j.jksus.2022.102035>.
  - Hossain, M.B.; Bhuiyan, M.N.; Kashem, A.; Hossain, M.K.;Sultana, S.; Nur, A.; Yu, J.; Albeshr, M.F.; Arai,T. Heavy Metals in Four Marine Fish and Shrimp Species from a Subtropical Coastal Area: Accumulation and Consumer Health Risk Assessment. *Biology* 2022, 11(12), 1780; <https://doi.org/10.3390/biology11121780>.
  - Shorna, S.; Quraishi, S. B.; Hosen, M. M.; **Hossain, M.K.**;Saha, B.;Paul, B.; Hossain, A .;Al-Mamun, M.H. Ecological risk assessment of trace metals in sediment from the old Bramaputra River in Bangladesh. *Chemistry and Ecology* **2021**, 18, 809-826.
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- Ahmed, S.; **Hossain, M. K.**; Haque, N.; Bruckard, W.; Chen, M. An Overview of Arsenic contamination in Bangladesh ground water. Commonwealth Scientific and Industrial Research Organization, **2021** (Scientific Report) Bangladesh –Australia Joint Collaboration.
  - Hossain, M. B.; Runu, U. H.; Sarker, M. M.; **Hossain, M. K.**; Parvin, A. Vertical distribution and contamination assessment of heavy metals in sediment cores of ship breaking area of Bangladesh. *Environ Geochem Health*, **2021** <https://doi.org/10.1007/s10653-021-00919-w>.
  - Hossain, M. B.; Semme, S. A.; Ahmed, Abu. S. S.; **Hossain, M. K.**; Porag, G. S.; Parvin, A.; Shanta, T. B.; Senapathi, V.; Sekar, S. Contamination levels and ecological risk of heavy metals in sediments from the tidal river Halda, Bangladesh *Arabian Journal of Geosciences* **2021**, 14, 158 (DOI 10.1007/s12517-021-06477-w).
  - Shorna, S.; Shawkat, S.; Hossain, A.; Quraishi, S. B.; Ullah, A. K. M.; Hosen, M. M.; **Hossain, M.K.**; Saha, B.; Paul, B.; Al-Mamun, M. H. Accumulation of Trace Metals in Indigenous Fish Species from the Old Brahmaputra River in Bangladesh and Human Health Risk Implications. *Biological Trace Element Research* **2021**, 199, 3478–3488.
  - Ahmed, A. S. S.; Hossain, B.; Semme, S.; Babu, S. M.; **Hossain, M. K.**; Moniruzzaman, M. Accumulation of trace elements in selected fish and shellfish species from the largest natural carp fish breeding basin in Asia: a probabilistic human health risk implication. *Environmental Science and Pollution Research* **2020**, 27, 37852–37865.
  - Mostafiz, F.; Islam, M. M.; Saha, B.; **Hossain, M. K.**; Moniruzzaman, M.; Al-Mamun, H. Bioaccumulation of trace metals in freshwater prawn, *Macrobrachium rosenbergii* from farmed and wild sources and human health risk assessment in Bangladesh. *Environmental Science and Pollution Research* **2020**, 27:16426–16438
  - **Hossain, M. K.**; Koirala, A. A.; Akhtar, U. S.; Song, M.; Yoon, K. B.; First Synthesis of Highly Crystalline, Hexagonally Ordered, Uniformly Mesoporous TiO<sub>2</sub>-B and Its Optical and Photocatalytic Properties. *Chem. Mater.* **2015**, 27, 6550–6555. (IF 10.45)
  - **Hossain, M. K.**; Akhtar, U. S.; Koirala, A. A.; Hwang, I. C.; Yoon, K. B.; Steam-assisted synthesis of uniformly mesoporous anatase and its remarkably superior photocatalytic activities, *Catal. Today* **2015**, 243, 222-228( IF 5.2)
  - Hossain, M. B.; Shanta, T. B.; Ahmed, A. S. S.; **Hossain, M. K.**; Semme, S. A.; Baseline study of heavy metal contamination in the Sangu river estuary, Chattogram, Bangladesh. *Marine Pollution Bulletin* **2019**, 140, 255-261.(IF 5.1)
  - Akhtar, U. S.; Zaman, M.M.; Islam, M. S.; Nigar, F.; **Hossain, M.K.**; Effect of Different Types of Glasses as Fluxing Agent on the Sintering Temperature of Bricks, *Transactions of the Indian Ceramic Society*, **2017**, 76(2), 128-132.
  - Aziz, S.; Saha K.; Sultana, N.; Nur, H. P.; Ahsan, M. A.; Ahmed, S.; **Hossain, M. K.**; Comparative studies of elemental composition in leaves and flower of *Catharanthus roseus* growing in Bangladesh. *Asian Pac. J. Trop. Biomed.* **2016**, 6(1): 50–54.
  - Das, S.S.; **Hossain, M.K.**; Mustafa M.G.; Sarker, B.S.; Parvin, A.; Saha, B.; Das, P.R.; Moniruzzaman, M.; Physicochemical Properties of Water and Heavy Metals Concentration of Sediments, Feeds and V
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arious Farmed Tilapia (*Oreochromis niloticus*) in Bangladesh. *Fish. Aqua*, **2017**, 4(1), 79-85.

- Das, P. R.; **Hossain, M. K.**; Sarker, B.S.; Parvin, A.; Das, S.S.; Moniruzzaman, M.; Saha, B.; Heavy Metals in Farm Sediments, Feeds and Bioaccumulation of Some Selected Heavy Metals in Various Tissues of Farmed *Pangasius hypophthalmus* in Bangladesh. *Fish. Aqua*, **2017**, 4(3), 222-230.
- Akhtar, U. S.; **Hossain, M. K.**; Miran, M. S.; Mollah, M. Y. A.; Synthesis and characterization of porous silica and polyaniline-porous silica composite materials with high surface area. *Bangladesh J. Sci. Ind. Res.* **2014**. 49(1), 1-8.
- Tansim, F.; Hossain, M.A.; Nusrat, S.; **Hossain, M. K.**; Lopa, D.; Haque, K. M. F.; Quality assessment of industrially processed fruit juices available in Dhaka City, Bangladesh. *Mal.J.Nutr.* **2010**, 16(3), 431-438.
- Salam, M. A.; Ahmed, K.; Morshed, A. J. M.; **Hossain, M. K.**; S. Chowdhury, S. Y.; Chowdhury, M. M.; Measurement of Natural and Artificial Radionuclides of Stevia Rebaudiana Bertoni Extract. *Bangladesh J. Sci. Ind. Res.* **2009**, 44(4), 467-472.
- Jahangir, A. A.; Mondal, R. K.; Nada, K.; Sarker, M. A. M.; Moniruzzaman, M.; **Hossain, M.K.**; Response of Different Level of Nitrogen and Phosphorus on Grain Yield, Oil Quality and Nutrient Uptake of Soybean. *Bangladesh J. Sci. Ind. Res.* **2009**, 44(2), 187-192.

#### Patent and industrial process

- Yoon, K. B.; **Hossain, M. K.**; Akhtar, U. S.; Method for Low Temperature Crystallization and Interconnection of Metal Oxide by Steam Treatment. *WIPO* (World Intellectual Property Organization), WO2015119457, August 13, 2015.
- **Hossain, M. K.**; Parvin, A.; Suchi, P. d.; Saha, B.; Moniruzzaman, M.; Ahmed, S.; Shaikh, A. A. Sulphanilic acid based on spot indicator for detection of Arsenic in Water. **2022** (Submitted to Bangladesh register office -intellectual property)
- Hossain, M. K.; Parvin, A.; Saha, B.; Moniruzzaman, M.; Ahmed, S. Development of in-situ Arsenic Detection Kit for Aqueous Medium. Ref: 39.02.0000.043.37.846.21/215 Dated 24.11.2021
- Chowdhury, J. U.; **Hossain, M. K.**; Morshed, A. J. M.; Chowdhury, S. Y.; A process for the production of stevia product as a sweetener. Sec/R&D/62-612/1034 dated 30/07/2008.

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#### **Seminar/ conference proceeding/ Presentation (Selective)**

- **Hossain, M. K.**; Akhtar, U. S.; Yoon, K. B.; Novel synthesis of high temperature tolerate order mesoporous TiO<sub>2</sub> B:A unique energy storage materials. **ACS Fall 2022, August 21 - 25, 2022 USA** (DIVISION: Division of Environmental Chemistry SESSION: Current Perspectives in General Environmental Chemistry)
- **Hossain, M. K.**; Akhtar, U. S.; Yoon, K. B.; Synthesis and characterization of novel periodic mesoporous organosilicas, SMS -1 and SMS-2 and its potential application on solar cells. **ACS**

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**Fall 2021, 22-26 August, USA** (Division of Environmental Chemistry SESSION: Current Perspectives in General Environmental Chemistry)

- **Hossain, M. K.**; Akhtar, U. S.; Ahmed, S.; Song, Yoon, K. B.; Structural Analysis of Various Morphology of Mesoporous Organosilicas using Transmission Electron Microscope. 5<sup>th</sup> Conference of Bangladesh Crystallographic Association, Dhaka University, Dhaka, January 2019 (Oral).
- **Hossain, M. K.**; Akhtar, U. S.; Moniruzzaman, M.; Industrial Water Pollution in Bangladesh and its Mitigation using the Catalyst under Ambient Condition. ICPEP-6, CSIR-National Botanical Research Institute, Lucknow, India from 27-30 November, 2018 (Oral)
- **Hossain, M. K.**; Akhtar, U. S.; Yoon, K.B: Synthesis and Microscopic structural Analyses of Periodic Mesoporous Organosilicas (PMOs), Bangladesh Chemical Congress, 2018 (Oral)
- **Hossain, M. K.**; Akhtar, U. S.; Moniruzzaman, M; Saha, B: Technique for decomposition of environmental pollutants (soil and water) under ambient condition. International Conference on Chemical Science Technology (PP/O8), 2018 (Oral)
- **Hossain, M. K.**; Akhtar, U. S.; Moniruzzaman, M; Saha, B.; Developed New Method for synthesis of TiO<sub>2</sub> and its used for contaminated soil remediation. International Conference on Chemical Science Technology (OP/B4), 2018, 20. (Oral)
- **Hossain, M. K.**; Akhtar, U. S.; Moniruzzaman, M; Saha, B.; Synthesis of High surface area crystalline TiO<sub>2</sub> Nanoparticle and its application on waste water treatment. *Bangladesh J.Sci.Ind.Res* 52( Special issue), 10, 2017 (Oral)
- **Hossain, M. K.**; Akhtar, U. S.; Koirala, A. R.; Song, M. K.; Yoon, K. B.; Synthesis of Highly Crystalline Hexagonally Ordered uniformly Mesoporous TiO<sub>2</sub>B and Its Optical and Photocatalytic Properties, 16<sup>th</sup> Asian Chem. Congres. 2016, 419(NM-PP-08) (Oral)
- **Hossain, M. K.**; Akhtar, U. S.; Koirala, A. R.; Song, M. K.; Yoon, K. B.; First Synthesis of Highly Crystalline Hexagonally Ordered Uniformly Mesoporous TiO<sub>2</sub>-B and Its Optical and Photocatalytic Properties. 16<sup>th</sup> Asian Chem. Congres. 2016, 253(NM-OP-16) (Oral)
- **Hossain, M. K.**; Akhtar, U. S.; Koirala, A. R.; Song, M. K.; Yoon, K. B.; Synthesis of Highly Crystalline Hexagonally Ordered uniformly Mesoporous TiO<sub>2</sub>B and Its Optical and Photocatalytic Properties, 16<sup>th</sup> Asian Chem. Congres. 2016, 203(IC-OP-15) (Oral)

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**Training and Workshop**

- Application and maintenance of ICPMS, WDXRF, FTIR, GC-MS, HR-TEM, BET, FE-SEM, XRD, UV-NIR (Carry 5000), SAXS, and Atomic Absorption Spectrophotometer (AAS)
- Training on Lab Management of ISO1705/9001 for Environmental sample analysis.
- Operating system and maintenance of Particle Size Analyzer
- Operating system and maintenance of FT-Raman Spectroscopy
- Operating system and maintenance of Gas Chromatography-Mass Spectrometry (GC-MS/MS)
- Thermo-Gravimetric and Differential Thermal Analyzer (TG/DTA) & Thermomechanical Analyzer (TMA)
- Dilute Solution Viscometer Using Automated Micro- Viscometer

**Training on ISO/IEC 17025:2017**

- 28<sup>th</sup> Accessor Training Course on ISO/IEC 17025:2017 (5 days). Bangladesh Accreditation Board (BAB)
  - 33<sup>rd</sup> Understanding Training course on ISO/IEC 17025:2017 (3 days). Bangladesh Accreditation Board (BAB)
  - Method Validation for ISO17025/2017 (5 days). Bangladesh Council of scientific and Industrial Research (BCSIR).
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- Analytical Method Validation for quality in analytical laboratory (Proficiency Testing). Bangladesh Council of scientific and Industrial Research (BCSIR).

### **International Workshop on Environmental pollution and Climate change (Data Analysis)**

- Short Lived Climate Pollutants (SLCPS) National Planning and Long Range Energy Alternative Planning System- Integrated Benefit Calculator (LEAP-IBC). Stockholm Environment Institute and Department of Environment.
- Geospatial Technology Based water Quality Monitoring system
- Strengthening Institutional Capacity to Reduce Short Lived Climate Pollutants(SLCPs), Inception workshop
- Role of International Network for Government Science (INGSA) in initiating Government Science advice in Bangladesh.
- Climate and Clean Air Coalition (CCAC), Department of Environment, Republic of Bangladesh.
- Final National Action Plan for Reducing SLCPs(Black Carbon) in Bangladesh
- Workshop on Institutional Support for Implementation of Reducing Emission from Deforestation and Forest Degradation (**REDD+**) policies and Measures. UN-REDD Bangladesh National programmed.

### **International Workshop on chemical Safety and Security**

- International Symposium on Chemical safety and Security Management ISCSSM-2020. BUET- Bangladesh National authority for Chemical Weapons Convention (BNACWC).
- Remote Chemical Security training for Chemists, Engineers and safety professionals -2021. Bangladesh university of Engineering and technology and US- department of state.

### **Special Research Grants and Award**

#### **Special Research Grants (4)**

1. Using the green nanotechnology for synthesis of TiO<sub>2</sub> Nanoaprticle and its used for dye sensitized solar cells and waste water treatment, No 39.00.0000.09.02.69.16-17/62 EAS-344 dated 15.01.2017,Ministry of Science and Technology, Republic of Bangladesh.
2. Using the nanotechnology for fabrication and characterization of TiO<sub>2</sub>-ZnO core-shell nanocomposite and its used for environmental pollutants degradation. Ref. No-39.00.0000.09. 02. 90.18-19.313EAS-12.Dated 24.01.2019Ministry of Science and Technology, Republic of Bangladesh
3. Novel template assisted synthesis of Anatase'IiO<sub>2</sub> catalyst and application 1br photocatalytic environmental pollutants degradation. 39.00.0000.09.14.019.21.745 ; 15.12.2021; Ministry of science and Technology, Bangladesh
4. Engineering of Lactated Assisted synthesis of rutile (TiO<sub>2</sub>) nanostructure for photocatalytic of Organic pollutants degradation (2022-23). <https://most.portal.gov.bd/sites/default/files/files/most.portal.gov.bd/npfblock//GO%20141122-final5.pdf>.

## Awards

1. International Zeolite Scholarship, Sogang University (2010-2012)
2. Special allocation project for Research and Development Award (2016-17 and 2018-19)

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## Other Activities

### UN –REPRESENTATIVE AS A COUNTRY DELEGATOR WITH MINISTRY OF ENVIRONMENT

- The Thirteen Session of the conference of the Parties (COP-13), the Sixteenth of the Committee for the review of the implementation of the convention (CRIC-16) and the Thirteen Session of the Committee science and Technology (CST-13) and Its high Level Segments, Ordos, Inner Mongolia China (04.09-2017-16.09.2017)
- TEAM MEMBER, INDEPENDENT AIR QUALITY MONITORING GROUP (IMG), DHAKA MASS RAPID TRANSIT DEVELOPMENT PROJECT (DMTCL).
- VISITING SCIENTIST ,CSIRO, MELBOURNE AUSTRALIA ARSENIC MITIGATION OF GROUND WATER IN BANGLADESH AND RESEARCH GAP ANALYSIS (DESIGN DOCTORAL RESEARCH WORK)

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## Personal Information

### Wife

Dr Umme Sarmeen Akhtar  
PhD in Chemistry (South Korea)  
Senior Scientific Officer, BCSIR, Dhaka

### Son (3)

Mohammad Ahnaf Hossain Faris (15/2/2012)  
Mohammad Al-Afif Hossain (28/02/2017)  
Mohammad Adib Hossain (15/2/2022)

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## References

### **Kyung Byung Yoon Ph.D.**

Professor of Chemistry  
Director, Korea Center for Artificial Photosynthesis (KCAP) and Center for Nano Material, Sogang University, Seoul, Republic of Korea.  
E-mail: yoonkb@sogang.ac.kr

### **Dr. Shahid Akhter Hossain**

Vice Chancellor of Eastern University, Dhaka, Bangladesh and Prof of Soil, Water and Environment, Dhaka University.  
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