## *Curriculum Vitae*

**Personal Information:**
Dr. QUAZI ARIF ISLAM
E-mail: arif.chem007@gmail.com
Nationality: Indian
Date of Birth: 25/03/1987
Gender: Male

**Permanent Address:**
Quazi Arif Islam, C/O- Quazi Abdul Alim
Puratan Line, Near Bharat Sangha Club
PO- Suri, District- Birbhum
Pin- 731101, West Bengal, India

**Present Position:**
Assistant Professor, Department of Chemistry, Alipurduar University (erstwhile Alipurduar College), West Bengal, India

**Date of Joining at Present Position:** 12th October, 2020

**Previous Positions:**
1. 06/11/2019 – 01/02/2020: Postdoctoral Fellow, Engineering Research Center of Nano-Geo Materials of Ministry of Education, Faculty of Materials Science and Chemistry, China University of Geosciences, Wuhan, China

2. 02/03/2017 – 25/10/2019: Postdoctoral Fellow, Centre for Advanced Functional Materials (CAFM), Indian Institute of Science Education and Research (IISER) Kolkata, India

**Education:**
1. Doctor of Philosophy (Ph.D) in Chemistry (2010-2016) from Fuel Cell and Battery Division, CSIR-Central Glass and Ceramic Research Institute (Degree Awarded by Jadavpur University), Kolkata, India.
*Thesis:* Development of mixed ionic and electronic conducting (MIEC) ceramic-based membranes for gas separation application; Supervisors: Dr. R.N. Basu and Dr. M.W. Raja.

2. Master of Science (M.Sc) in Chemistry (Specilization: Inorganic Chemistry) (2008-2010) from Department of Chemistry, Burdwan University, West Bengal, India (1st class).

3. Bachelor of Science (B.Sc) in Chemistry (2005-2008) from Department of Chemistry, Suri Vidyasagar College, Burdwan University, West Bengal, India (1st class).

4. Higher Secondary (12th) from WBCHSE on 2005 (1st class).

5. Madhyamik (10th) from WBBSE on 2003 (1st class).

**Research Interests:**
- Perovskite oxides and nanomaterials for electrocatalytic water splitting, metal-air battery
- Development of nanostructured materials for low temperature solid oxide fuel cell (LT-SOFC)
- Development of novel compositions for hydrogen and oxygen separation membranes
- Exsolution of nanoparticles on metal oxides
- Development of 2D materials

**Key Research Contributions:**

- Development of perovskite oxide nanorods from aquatic weed for dense ceramic oxygen separation membrane application
- Novel compositions development for hydrogen and oxygen gas separation membrane applications
- Development of efficient trifunctional electrocatalyst based on perovskite oxide exsolution
- Modification of exsoluted nanoparticles for more effective water splitting in basic medium
- Preparation of perovskite oxide 2D nanosheets by wet chemical route

**Publications:**

1**) Quazi Arif Islam**, Sourav Nag, Rajendra Nath Basu, Electrical properties of Tb-doped barium cerate, *Ceramics International* 39 (2013) 6433-6440. (IF: 4.52)

2) **Quazi Arif Islam**, Sourav Nag, Rajendra Nath Basu, Study of electrical conductivity of Ca-substituted $La_2Zr_2O_7$, *Materials Research Bulletin* 48 (2013) 3103-3107. (IF: 4.64)

3) **Quazi Arif Islam**, Mir Wasim Raja, Rajendra Nath Basu, Synthesis of $BaBi_{0.2}Co_{0.35}Fe_{0.45}O_{3-d}$ by a novel aqueous soft chemical method and its characterizations, *Journal of Alloys and Compounds* 583 (2014) 7-14. (IF: 5.31)

4) **Quazi Arif Islam**, Mir Wasim Raja, Chiranjib Satra, Rajendra Nath Basu, Low temperature synthesis of nanocrystalline scandia stabilized zirconia by aqueous combustion method and its characterizations, *Bulletin of Materials Science* 38(6) (2015) 1473-1478. (IF: 1.78)

5) **Quazi Arif Islam**, Mir Wasim Raja, Rajendra Nath Basu, Filter paper derived cross-linked interconnected $BaBi_{0.2}Co_{0.35}Fe_{0.45}O_{3-\delta}$ morphology with enhanced oxygen permeation property, *RSC Advances* 6 (2016) 882-890. (IF: 3.36)

6) **Quazi Arif Islam**, Mir Wasim Raja, Rajendra Nath Basu, $La_xSr_{1-x}Co_{0.35}Bi_{0.2}Fe_{0.45}O_{3-\delta}$ (x = 0.5 to 0.8): A new series of oxygen separation membrane, *International Journal of Hydrogen Energy* 41 (2016) 4682-4689. (IF: 5.81)

7) **Quazi Arif Islam**, Sourav Nag, Rajendra Nath Basu, Chemical Stability and Electrical Conductivity of $Ba_{0.8}Ce_{0.85-x}Zr_xTb_{0.15}O_{3-\delta}$ Proton Conductors with ZnO as Sintering Aid, *Transactions of the Indian Ceramic Society* 75 (2016) 1-8. (IF: 1.72)

8) Debasish Das, **Quazi Arif Islam**, Rajendra Nath Basu, Electrophoretic Deposition Kinetics and Characterization of Ni-$La_{1.95}Ca_{0.05}Zr_2O_{7-\delta}$ Particulate Thin Films, *Journal of the American Ceramic Society* 99 (2016) 2937-2946. (IF: 3.78)

9) Mir Wasim Raja, **Quazi Arif Islam**, Rajendra Nath Basu, Oxygen separation membrane derived from aquatic weed: A novel bio-inspired approach to synthesize $BaBi_{0.2}Co_{0.35}Fe_{0.45}O_{3-\delta}$ perovskite from Water Hyacinth (Eichhornia Crassipes), *Journal of Membrane Science* 522 (2017) 168-174. (IF: 8.74)

10) **Quazi Arif Islam**, Mir Wasim Raja, Rajendra Nath Basu, Zr- and Tb-doped barium cerate-based cermet membrane for hydrogen separation application, *Journal of the American Ceramic Society* 100 (2017) 1360-1367. (IF: 3.78)

11) **Quazi Arif Islam**, Rahul Majee, Sayan Bhattacharyya, Bimetallic Nanoparticle Decorated Perovskite Oxide for State-of-the-art Trifunctional Electrocatalysis, *Journal of Materials Chemistry A* 7 (2019) 19453-19464. (IF: 12.73)

12) Rahul Majee, **Quazi Arif Islam**, Sayan Bhattacharyya, Surface Charge Modulation of Perovskite Oxide at the Crystalline Junction with Layered Double Hydroxide for Durable Rechargeable Zinc-air Battery, *ACS Applied Materials & Interfaces* 11 (2019) 35853–35862. (IF: 9.22)

13) Rahul Majee‡, **Quazi Arif Islam**‡, Surajit Mondal, Sayan Bhattacharyya, An electrochemically reversible lattice with redox active A-sites of double perovskite oxide nanosheets to reinforce oxygen electrocatalysis, *Chemical Science* 11 (2020) 10180-10189. (IF: 9.82)

14) Xin Chen, Bao Dong, **Quazi Arif Islam**, Huaibing Song, Yan Wu, Semiconductor-ionic properties and device performance of heterogeneous La-doped $CeO_2$-ZnO nanocomposites, *International Journal of Hydrogen Energy* 46 (2021) 9968-9975. (IF: 5.81)

### *After Joining Alipurduar College/Alipurduar University*

15) Surajit Mondal, Rahul Majee, **Quazi Arif Islam**, Sayan Bhattacharyya, 2D Heterojunction Between Double Perovskite Oxide Nanosheet and Layered Double Hydroxide to Promote Rechargeable Zinc-Air Battery Performance, *ChemElectroChem* 7 (2020) 5005-5012. (IF: 4.59)

16) **Quazi Arif Islam**, Sara Paydar, Nabeela Akbar, Bin Zhu, Yan Wu, Nanoparticle exsolution in perovskite oxide and its sustainable electrochemical energy systems, *Journal of Power Sources* 492 (2021) 229626. (IF: 9.12)

17) Sara Paydar, Jin Peng, Liwen Huang, Quan Shi, Nabeela Akbar, **Quazi Arif Islam**, Akbar Muhammad, Yueming Xing, Jung-Sik Kim, Yan Wu, Performance analysis of $LiAl_{0.5}Co_{0.5}O_2$ nanosheets for intermediate-temperature fuel cells, *International Journal of Hydrogen Energy* 46 (2021) 26478-26488. (IF: 5.81)

18) Kailin Wang, Tianqi Wang, **Quazi Arif Islam**, Yan Wu, Layered double hydroxide photocatalysts for solar fuel production, *Chinese Journal of Catalysis* 42 (2021) 1944-1975. (IF: 8.27)

19) Rahul Majee, Sahanaz Parvin, **Quazi Arif Islam**, Ashwani Kumar, Bharati Debnath, Surajit Mondal, Subhajit Bhattacharjee, Satarupa Das, Arun Kumar, Sayan Bhattacharyya, The Perfect Imperfections in Electrocatalysts, *The Chemical Record*, https://doi.org/10.1002/tcr.202200070 (IF: 6.77)

**Fellowship and Awards:**

- **2012: Best Poster Paper Award** for the paper entitled *"Tb-doped Barium Cerate: A High Temperature Proton Conductor for Dense Ceramic Membrane"* in International workshop on Recent Advancement in Membranes for Liquid & Gas Filtration held at CGCRI, Kolkata
- **2014: CSIR** (Council of Scientific & Industrial Research) **Senior Research Fellowship** in 2014
- **2014: Best Oral Paper Award** for the paper entitled *"Ca-doped Lanthanum Zirconate: A Hydrogen Separation Membrane"* in 3rd Annual Workshop, Research Scholars' Day held at CGCRI, Kolkata
- **2015: Best Oral Paper Award** for the paper entitled *"Cross-linked Interconnected Powder Morphology Obtained by Filter Paper Templating Method for Application as Oxygen Separation Ceramic Membrane"* in Indian Innovations in Materials Research: New Materials and Processes (IIMR-15) held at CGCRI, Kolkata
- **2016: MRSI Young Scientist-2016 Award** for the paper entitled *"Synthesis of nanorods from bio-waste Eichhornia Crassipes: A novel approach to develop oxygen separation membrane"* at the Young Scientists' Colloquium 2016, Materials Research Society of India (MRSI), Kolkata Chapter held at S. N. Bose National Centre for Basic Sciences, Kolkata
- **2017: SERB-National Postdoctoral Fellowship,** Department of Science & Technology, Government of India
- **2021: Best Paper of Session 1st** for the paper entitled *"Surface Engineering of Perovskite Oxide with Bimetallic Nanoparticles for Electrocatalytic Water Splitting"* in National Web-based Conference on Environmental Determinism, Diverse Pollutions, Sources, and Controlling Management Through Sciences and Humanities organized by Alipurduar University

**Funding:**
Received project funding for my SERB-National Postdoctoral Fellowship. Acted as the project investigator (PI) of the project. Total Funding amount is Rs. 1920000/-.

**Papers Presented in Conferences (National/International):**
1) **Q. A. Islam**, S. Nag, R. N. Basu
*Synthesis and Characterization of Terbium doped Barium Cerate Ceramics as Proton Conductors*
India-EU 3rd EICOON School on Nano materials
CSIR-CGCRI, Kolkata, May 3-4, 2012
POSTER
2) **Q. A. Islam**, S. Nag, R. N. Basu
*Investigation of Tb-doped Barium Cerate: A High Temperature Proton Conductor*
1st Annual Workshop, Research Scholars' Day
CSIR-CGCRI, Kolkata, July 18, 2012
POSTER
3) **Q. A. Islam**, S. Nag, R. N. Basu
*Tb-doped Barium Cerate: A High Temperature Proton Conductor for Dense Ceramic Membrane*
International workshop on Recent Advancement in Membranes for Liquid & Gas Filtration
CSIR-CGCRI, Kolkata, December 27, 2012
POSTER
4) **Q. A. Islam**, S. Nag, R.N. Basu
*Ca-doped Lanthanum Zirconate Proton Conductor for Gas Separation Application*
100th Science Congress
Calcutta University, January 3-7, 2013
POSTER
5) **Q. A. Islam**, M. W. Raja, R. N. Basu
*Mixed Ionic and Electronic Conductor based $BaBi_{0.2}Co_{0.35}Fe_{0.45}O_{3-\delta}$: Dense Ceramic Membrane for Oxygen Separation*
2nd Annual Workshop, Research Scholars' Day
CSIR-CGCRI, Kolkata, August 20, 2013
POSTER
6) **Q. A. Islam**, M. W. Raja, R. N. Basu
*$BaBi_{0.2}Co_{0.35}Fe_{0.45}O_{3-\delta}$: A Mixed Ionic and Electronic Conductor based Perovskite Material for Oxygen Separation*
NMD-ATM 2013
IIT-BHU, Varanasi, November 12-15, 2013
POSTER
7) **Q. A. Islam**, S. Nag, R. N. Basu
*Ca-doped Lanthanum Zirconate: A Potential Membrane Material for $H_2$ Separation*
International Conference on Membranes and Applications (ICMA-2013)
CSIR-CGCRI, Kolkata, November 22-23, 2013
POSTER
8) **Q. A. Islam**, M. W. Raja, R. N. Basu
*$Ba_{0.9}Bi_{0.2}Co_{0.35}Fe_{0.45}O_{3-\delta}$: A Potential Dense Ceramic Membrane for Oxygen Separation*
77th Annual Session of the Indian Ceramic Society
Indian Ceramic Society, Jamshedpur Chapter
S.N.T.I., N Road, Bistupur, Jamshedpur, December 19-20, 2013
ORAL
9) **Q. A. Islam**, S. Nag, R. N. Basu
*Ca-doped Lanthanum Zirconate: A Hydrogen Separation Membrane*

3rd Annual Workshop, Research Scholars' Day
CSIR-CGCRI, Kolkata, August 20, 2014
ORAL
10) **Q. A. Islam**, R. N. Basu
*Development of Mixed Ionic and Electronic Conductor based Ni-$La_{2-x}Ca_xZr_2O_{7-\delta}$ Membrane for Hydrogen Separation*
NMD-ATM 2014
College of Engineering, Pune, November 12-15, 2014
ORAL
11) **Q. A. Islam**, M. W. Raja, R. N. Basu
*Interconnected Chain like Morphology of $BaBi_{0.2}Co_{0.35}Fe_{0.45}O_{3-\delta}$ Synthesized by FPT Process for Oxygen Separation Membrane*
26th AGM MRSI, Materials for Inclusive Development
Department of Physics, University of Rajasthan, February 9-11, 2015
POSTER
12) **Q. A. Islam**, M. W. Raja, R. N. Basu
*Cross-linked Interconnected Powder Morphology Obtained by Filter Paper Templating Method for Application as Oxygen Separation Ceramic Membrane*
Indian Innovations in Materials Research: New Materials and Processes (IIMR-15)
CSIR-CGCRI, Kolkata, June 25-27, 2015
ORAL
13) **Q. A. Islam**, M. W. Raja, R. N. Basu
*Mimicking of microstructure: Advanced synthesis technique for making $BaBi_{0.2}Co_{0.35}Fe_{0.45}O_{3-\delta}$ perovskite as oxygen separation membrane*
Young Scientists' Colloquium – 2015 (YSC 2015), Materials Research Society of India (MRSI), Kolkata Chapter
CSIR-CGCRI, Kolkata, September 11, 2015
POSTER
14) **Q. A. Islam**, M. W. Raja, R. N. Basu
*Synthesis of nanorods from bio-waste Eichhornia Crassipes: A novel approach to Develop oxygen separation membrane*
Young Scientists' Colloquium – 2016 (YSC 2016), Materials Research Society of India (MRSI), Kolkata Chapter
S. N. Bose National Centre for Basic Sciences, Kolkata, September 16, 2016
ORAL
15) **Q. A. Islam**
*Surface Engineering of Perovskite Oxide with Bimetallic Nanoparticles for Electrocatalytic Water Splitting*
Two Days National Web-based Conference on Environmental Determinism, Diverse Pollutions, Sources, and Controlling Management Through Sciences and Humanities
Alipurduar University, March 22-23, 2021
ORAL (Online)

**Supervising and Mentoring Activities:**

I always involved in guiding and mentoring junior students (PhD, project students, master and bachelor students) in my former labs. At present in Alipurduar University (erstwhile Alipurduar College) I am acting as a co-supervisor of two PhD research scholars.

**Short Description of PhD and Postdoc Work:**
My PhD work aims to develop novel mixed ionic and electronic conducting (MIEC) based dense ceramic membranes for their potential application in hydrogen and oxygen gas separation technology. For this purpose, $BaCeO_3$ and $BaCoO_3$ ($ABO_3$ type) based perovskite materials have been selected as primary frame works, where variety of dopants are introduced both in its A and B-sites to study their effects in membrane performance in terms of hydrogen and oxygen separation respectively. A large number of doped and co-doped materials have been synthesized and characterized in detail and their permeation performance has been examined using in-house fabricated permeation measurement set up.

For hydrogen separation membrane development, calcium doped $La_2Zr_2O_7$ pyrochlore and Tb, Zr doped $BaCeO_3$ perovskite systems have been explored and characterized in detail. To introduce electronic contribution, nickel has been mixed with the optimized proton conductors and finally, their hydrogen permeation flux is studied.

For oxygen separation membrane development, La and Sr doped novel type $La_xSr_{1-x}Fe_{0.45}Co_{0.35}Bi_{0.2}O_{3-\delta}$ (x = 0.5 to 0.8) compositions, $BaM_{0.2}Co_{0.35}Fe_{0.45}O_{3-\delta}$ (M = Nb/Sc/Ta) perovskites have been developed. The developed membranes remain stable during 120 h of continuous operation at 900$^o$C under the air/Ar gradient. Steady oxygen permeation flux of the membranes for more than 50 h of operation in presence of carbon dioxide as the sweep gas reflects improved chemical stability of the developed membranes.

In another approach, different synthesis methodologies namely, alanine assisted combustion methods, filter paper templating method and bio-inspired synthesis process have also been explored in the present thesis to engineer the microstructure of $BaBi_{0.2}Co_{0.35}Fe_{0.45}O_{3-\delta}$ (BBCF) perovskite oxide and to study their effect in physico-chemical properties.

Apart from my thesis topic, during my Ph.D., I also worked on the synthesis of electrolyte (Eleven mol% scandia-stabilized zirconia), and anode material (Ni-$Ce_{0.75}Zr_{0.25}O_{2-\delta}$) for solid oxide fuel cell application, ceramic separator ($SiO_2$, $ZrO_2$ loaded filter paper) for Li-ion battery.

During my postdoc, I worked on a number of projects related to electrolyte materials for low-temperature solid oxide fuel cell application, oxygen reduction reaction, electrocatalytic water splitting, and Zn-air battery application. For this purpose, $SrNb_{0.1}Co_{0.9-x}Ni_xO_{3-\delta}$ perovskite with Co-Ni alloy nanoparticles on the surface, $BaCo_{0.5}Fe_{0.3}Ta_{0.2}O_{3-\delta}$ perovskite with $Co_xP_y$, $Co_xS_y$ on the surface, NiFe sheet on $Ba_{0.5}Sr_{0.5}Co_{0.8}Fe_{0.2}O_{3-\delta}$, $PrBaCo_{2-x}Mn_xO_{6-\delta}$ double perovskite nanosheets have been synthesized and characterized in detail.

**Expertise and Training:**
Development of advanced functional materials for versatile applications including-

- Hydrogen and oxygen separation membrane
- Electrocatalytic water splitting
- Solid oxide fuel cell
- Metal-air battery

**Skills and Techniques:**

- Synthesis of functional materials in large volume by solid state, sol-gel and combustion method
- Structural engineering of nanostructured materials
- Development of novel synthesis processes
- Material characterizations- Physical and electrochemical
- Development of in-house gas permeation set-up

- Instruments handled: X-ray diffractometer, gas chromatography, dilatometer, thermo gravimetric analyser, table top scanning electron microscope, Fourier-transform infrared spectrometer, ultraviolet-visible spectrometer, 4-probe conductivity measurement set-up, Impedance spectroscopy, Potentiostat, surface area analyser, scan coater.

**Members of Committee at Present Position:**

1) Acting as a Joint Director (Additional Charge) of the Post Graduate Certificate Course in Tourism (effective from 15th December, 2021-till date)
2) Acting as a Member of Campus Beautification Committee (effective from November, 2021-till date)
3) Acting as a Member of Undergraduate Admission Committee (effective from June, 2022-till date)

**Others:**

- Membership in Indian Science Congress during 2012-2013
- Membership in Indian Ceramic Society during 2013-2014
- ResearchGate link: https://www.researchgate.net/profile/Quazi_Islam
- Google scholar link: https://scholar.google.com/citations?hl=en&user=Lhvgx3oAAAAJ&view_op=list_works&sortby=pubdate