

Hassan Zeb

(PhD Engineering)



Contact



Marghazar Colony, Multan Road,
Lahore, Pakistan



+92 321 4907 044



hassanzeb.ieee@pu.edu.pk

Languages

English
Urdu
Punjabi
Hindko

About me

Nationality - Pakistani
Date of Birth - July 3rd, 1984
Marital status - Married

Career Highlights

- ⇒ Experience (Research and Teaching): 12 years
- ⇒ Publications: 30
- ⇒ Cummulative Impact Factor: > 100
- ⇒ Book Chapters: 3
- ⇒ Patents: 2
- ⇒ Research Funding: 8.42 million PKR
- ⇒ Student Supervision (Undergraduate and Graduate): 40
- ⇒ Conferences (Invited speaker, Organized, Attended): 16
- ⇒ Membership: Pakistan Institute of Chemical Engineers

Skills Acquired

- Technical Writing
- Working with supercritical fluids
- Expert level operation of high pressure stirred reactor.
- Analytical Technics including Elemental Analyzer, GC-FID, GC-TOF/MS, GPC, HPLC, TGA, RGA-GC, BET Surface Area Analyzer, XRD, XRF, TEM, SEM, TAN, Karl-Fischer titrator.
- Aspen Plus, Endnote, Origin, Chemcad, MS Excel, MS Word

Professional Experience

1. Assistant Professor - 04/2018 to Present
Institute of Energy and Environmental Engineering, University of
the Punjab, Lahore, Pakistan

Tasks performed:

- Student supervision (Ph.D. = 3, M.Phil./M.Sc. = 31, B.Sc. = 12)
- Program Coordinator (Ph.D. Energy Engineering, M. Phil. Coal Technology).
- In charge Examinations.
- Coordinator Student Affairs.
- Developed a graduate level course "Advanced Thermochemical Conversion Processes" and several undergraduate courses as per the requirements of Washington Accord.
- Taught a number of undergraduate and graduate (both M.Sc. and Ph.D.) courses.

2. Researcher - 09/2013 to 02/2018
Sungkyunkwan Advanced Institute of Nano Technology (SAINT)
Sungkyunkwan University, Suwon, South Korea

Tasks performed:

Project 1 (Headed the group of 2 Ph. D. students and 1 M.S. student):
"Development of Supercritical fluid technology for the biodiesel
production from microalgae".

Funded by New and Renewable Energy Core Technology Program of
the Korea Institute of Energy Technology (20143030090940).

2 Publications

Education

Ph.D. in Engineering, Nano Engineering - 2018

Sungkyunkwan University, Suwon, South Korea
CGPA – 3.84 / 4.5

Thesis Title – “Macroalgae biomass liquefaction using supercritical alcohols”.

M.Sc. in Chemical Engineering - 2011

Karlstad University, Karlstad, Sweden
CGPA – 3.5 / 4

Thesis Title – “Study of Bleaching of Old Newsprint Recycled Paper Reproduction of Newspaper Material”.

B.Sc. in Chemical Engineering - 2008

Institute of Chemical Engineering and Technology, University of the Punjab, Lahore, Pakistan
CGPA – 3.3 / 4

Professional Experience (Cont..)

Project 2 (Headed the group of 1 Ph. D. student and 1 M.S. student):

"Bio-oil from macroalgae, an alternative to heavy fuel oil".

Funded by Korea Electric Power Corporation (R15XA03-05).

2 Publications, 1 Patent

Project 3 (Worked as a group member):

"Supercritical fluid liquefaction of sewage sludge for bio-oil production".

New and Renewable Energy Core Technology Program of the Korea Institute of Energy Technology (20143030100980).

1 Publication, 1 Patent

Project 4 (Worked as a group member):

"Development of technology to convert lignin into transport fuel using a thermochemical fusion process based on self-generating highly active hydrogen".

Funded by New and Renewable Energy Core Technology Program of the Korea Institute of Energy Technology (20143030100980).

1 Publication

Project 5 (Worked as a group member):

"Unconventional crude oil and petroleum emulsions upgrading for current refinery systems".

Funded by Energy Efficiency and Resources Core technology Program under Ministry of Trade, Industry and Energy, Republic of Korea (20152010103120).

1 Publication

3. Lecturer - 06/2012 to 07/2013

Ghulam Ishaq Khan Institute of Engineering Sciences and Technology (GIK), Swabi, Pakistan

Tasks performed:

- Courses taught: Corrosion Science and Technology, Polymer Engineering, and Industrial Chemistry
- Curriculum design for B.Sc. Chemical Engineering Program and subsequent approval from Pakistan Engineering Council (PEC)
- Laboratories development for B.Sc. Chemical Engineering Program

4. Research Assistant - 01/2012 to 06/2012

University of Engineering and Technology (UET), Lahore, Pakistan

Tasks performed:

Project (Worked as a sole researcher):

"Control of pollution emissions and increase in efficiency of domestic gas burner".

1 Publication

Professional Awards

- **Supergreen 2015, The 9th International Symposium on Supercritical Fluid Technology**
Best Poster Award – 2015
Seoul, South Korea
- **International Symposium on Advances in Supercritical Fluids (ISASF)**
Best Poster Award – 2014
Seoul, South Korea
- **Partial Support Scholarship**
Awarded for Doctoral studies – 2017
Higher Education Commission of Pakistan (HEC)
- **International Student Scholarship**
Awarded for Doctoral studies – 2013
Sungkyunkwan University, Suwon, South Korea

Research

Patents

- J. Kim, H. Prajitno, **H. Zeb**, “Method for upgrading bio-oil using supercritical alcohols and upgraded bio-oil by the method”, US Patent, US 2016/0348009, 01/12/2016
- J. Kim, **H. Zeb**, “Bio-oil from macroalgae and method for producing thereof”, Korea Patent, 10-1754465, 29/06/2017

Book Chapters

- **H. Zeb***, A. Riaz. “Introduction to Organic–Inorganic Nanohybrids”. In: Rizwan, K., Bilal, M., Rasheed, T., Nguyen, T.A. (eds) Hybrid Nanomaterials. Materials Horizons: From Nature to Nanomaterials. Springer, Singapore (2022). https://doi.org/10.1007/978-981-19-4538-0_1
- S. Kanwal, H. Sana, M. K. Khan, **H. Zeb***, J. Kim. “Challenges and Future Perspective of Biomass Conversion to Various Products”. Submitted in: Nanomaterials in Biomass Conversion: Advances and Applications for Bioenergy, Biofuels and Bio-Based Products. Elsevier (2023).
- S. Kanwal, H. Sana, M. K. Khan, R. Mujahid, **H. Zeb***. “Biomass feedstock; A Sustainable and Renewable Source for Energy Production”. Submitted in: Nanomaterials in Biomass Conversion: Advances and Applications for Bioenergy, Biofuels and Bio-Based Products. Elsevier (2023)

Journal Publications

- **H. Zeb**, M. A. Hussain, M. Javed, T. Qureshi, H. Dawood, R. Abbas, M. H. Siddiqi “Study of Bio-oil Production from Sewage Sludge of a Municipal Wastewater Treatment Plant Using Hydrothermal Liquefaction (HTL)” Thermal Science 2023, 1 p.262.
- M. Asif, M. A. Hussain, A. Riaz, R. Mujahid, M. S. Akram, B. Haider, Kanwal, **H. Zeb*** “A Physical Coal Cleaning Approach for Clean Energy Production from Low Grade Lakhra Coal of Pakistan Using Diester Table” Journal of the Pakistan Institute of Chemical Engineers 2023, 51 (2) 1.
- M. Asif, S. S. Bibi, S. Ahmed, M. Irshad, M. S. Hussain, **H. Zeb**, M. K. Khan, J. Kim, “Recent advances in green hydrogen production, storage and commercial-scale use via catalytic ammonia cracking” Chemical Engineering Journal, 2023.
- H. Sana, A. Riaz, Z. Arshad, S. T. Zahra, J. Akhtar, S. Kanwal, **H. Zeb***, J. Kim, “Effect of pyrolysis temperature on the physiochemical properties of biochars produced from raw and fermented rice husks” Korean Journal of Chemical Engineering 2023.
- H. Sana, M. A. Hussain, R. Mujahid, A. Riaz, M. S. Akram, B. Haider, A. Ahsan, S. Kanwal, **H. Zeb*** “Cleaning of Thar coal by froth flotation and water washing” Journal of the Pakistan Institute of Chemical Engineers 2023, 50 (2).

- S. Ahmed, W. W. Kazmi, F. N. Butt, M. Irshad, F. Sher, S. M. A. Kazmi, U. M. Chaudry, **H. Zeb**, T. S. Jun*, M. K. Khan "Fabrication of nanocage structured based electrocatalyst for oxygen evolution reactions" *Materials Letters* 2023, 331.
- R. Tariq, A. Inayat, M. Shahbaz, **H. Zeb***, C. Ghenai, T. A. Ansari, J. Kim "Kinetic and thermodynamic evaluation of pyrolysis of jeans waste via coats-redfern method" *Korean Journal of Chemical Engineering* 2023, 40 (1).
- Majeed, S. Kanwal, S. A. Batool, M. N. Chaudhry, **H. Zeb**, G. H. Abbasi, Z. Malik, A. Munir "Physio-chemical evaluation and Co-combustion efficiency of different biomass waste fractions with indigenous coal blends for utilization as alternative fuel" *Global Nest Journal* 2022, 24 (1).
- S. Bashir, S. Kanwal, **H. Zeb**, Z. B. Baber, A. Majeed "Integrated energy planning and modeling (IEPM) for sustainable electricity generation in Pakistan: Challenges and limitations" *Energy Exploration & Exploitation* 2022.
- M. H. Siddiqi, X. M. Liu*, M. A. Hussain, T. Qureshi, A. N. Tabish, H. U. Lateef, **H. Zeb**, M. Farooq, S. Nawaz, S. Nawaz "Evaluation of physiochemical, thermal and kinetic properties of wheat straw by demineralising with leaching reagents for energy applications" *Energy*, 2022, 238 (Part C).
- U. Ahmed*, M. A. Hussain, M. Bilal, **H. Zeb**, U. Zahid, S. A. Onaizi, A. G. A. Jameel "Utilization of low-rank coals for producing syngas to meet the future energy needs: technical and economic analysis" *Sustainability*, 2021, 13 (19).
- **H. Zeb***, M. A. Hussain*, I. Ahmed, M. S. Akram, B. Haider, R. Haider, Z. B. Babar, R. M. Saleem, A. Ahsan, I. Aziz, M. Arif "Study of bleaching of old newsprint recycled paper: reproduction of newspaper material" *Material Research Express*, 2021, 8 (8).
- U. Ahmed, M. A. Hussain, M. Bilal, **H. Zeb***, N. Ahmad, N. Ahmad, M. Usman "Production of hydrogen from low rank coal using process integration framework between syngas production processes: techno-economic analysis" *Chemical Engineering and Processing: Process Intensification*, 2021, 169.
- M. A. Hussain, E. J. Choi, A. Maqbool, M. Atif, **H. Zeb**, J. G. Yeo, J. A. Yu, Y. H. Cho, M. Noh, J. W. Kim "An efficient hydration of nitriles with ruthenium-supported heterogeneous catalyst in water under moderate conditions" *Journal of Industrial and Engineering Chemistry*, 2021, 99.
- N. Tabish, M. Kazmi, M. A. Hussain, I. Farhat, M. Irfan, **H. Zeb**, U. Rafique, H. Ali, M. H. Siddiqi, M. S. Akram "Biomass waste valorization by acidic and basic leaching process for thermochemical applications" *Waste and Biomass Valorization*, 2021, 12 (11).
- U. M. Chaudry, H. W. Ahmad, M. R. Tariq, A. Farooq, M. K. Khan, F. Sher, **H. Zeb**, K. Hamad, "Effect of post weld heat treatment on the microstructure and electrochemical characteristics of dissimilar material welded by butter method" *Materials*, 2020, 13 (20), 4512-21.
- M. Shahbaz*, S. Yusup, T. Al-Ansari, A. Inayat, M. Inayat, **H. Zeb**, M.S. Alnarabiji*, "Characterization and reactivity study of coal bottom ash for utilization in biomass gasification as an adsorbent/catalyst for cleaner fuel production", *Energy & Fuel*, 2019, 33, 11318-11327.
- Riaz, D. Verma, **H. Zeb**, J. H. Lee, J. C. Kim, S. K. Kwak, J. Kim, "Solvothermal liquefaction of alkali lignin to obtain a high yield of aromatic monomers while suppressing solvent consumption", *Green Chemistry*, 2018, 20, 4957-4974.
- **H. Zeb**, J. Park, A. Riaz, C. K. Ryu, J. Kim*, "High-yield bio-oil production from macroalgae (*Saccharina japonica*) in supercritical ethanol and its combustion behavior", *Chemical Engineering Journal*, 2017, 327, 79-90.
- H. Prajitno, **H. Zeb**, J. Park, C. Ryu, J. Kim*, "Efficient renewable fuel production from sewage sludge using a supercritical fluid route", *Fuel*, 2017, 200, 146-152.
- **H. Zeb**, J. Kim*, "Effective conversion of the carbohydrate-rich macroalgae (*Saccharina japonica*) into bio-oil using low-temperature supercritical methanol", *Energy Conversion and Management*, 2017, 151, 357-367.

- H. Jo, H. Prajitno, **H. Zeb**, J. Kim*, "Upgrading low-boiling-fraction fast pyrolysis bio-oil using supercritical alcohol: Understanding alcohol participation, chemical composition, and energy efficiency", Energy Conversion and Management, 2017, 148, 197-209.
- M. K. Khan, B. Sarkar, **H. Zeb**, M. Yi, J. Kim*, "Simultaneous breaking and conversion of petroleum emulsions into synthetic crude oil with low impurities", Fuel, 2017, 199, 135-144.
- **H. Zeb**, D. J. Choi, Y. Kim*, J. Kim*, "A new role of supercritical ethanol in macroalgae liquefaction (Saccharina japonica): Understanding ethanol participation, yield, and energy efficiency", Energy, 2016, 118, 116-126.
- **H. Zeb**, A. Riaz, J. Kim*, "Understanding the effect of biomass-to-solvent ratio on macroalgae (Saccharina japonica) liquefaction in supercritical ethanol" Journal of Supercritical Fluids, 2016, 120, 65-74.

Invited Speaker

- On "Optimizing design and process parameters to improve thermal efficiency of domestic gas stove burners" in International Conference on Energy, Water & Environment (ICEWE) at University of Engineering & Technology Lahore, on Mar 31, 2021.
- On "Production of bioethanol from biodegradable kitchen waste: optimization of saccharification and fermentation conditions" in International Conference on Advances in Chemical Engineering and Sciences (ICACES) at University of Engineering & Technology Lahore, on Jun 9, 2021.

Funded Research Projects

Title	Amount	Funding Source	Year
Production of valuable liquid and solid products simultaneously from microwave treatment of solid bio-wastes/ low grade coal and their blends	0.15 million PKR	University of the Punjab	2019
Optimizing performance of microwave assisted conversion of solid feedstocks	0.20 million PKR	University of the Punjab	2021
Bio-Crude and valuable chemical production from algal biomass via supercritical fluid liquefaction	8.07 million PKR	Higher Education Commission of Pakistan	2022

Conferences Organized

- **Chief Organizer**, Symposium on "Production of biofuel and biochemicals" in Engineering Congress on Energy and Environment" at the Institute of Energy & Environmental Engineering, University of the Punjab on Dec 22, 2020.

Conference Presentations

- **H. Zeb**, "Optimizing the change in biomass-to-solvent ratio for biomass liquefaction", Dec 2021, International Conference on Physical Sciences and Engineering (ICPSE), Rahim Yar Khan, Pakistan
- Z. B. Babar*, H. Sattar, R. Haider, **H. Zeb**, A. Saeed, A. Razzaq, F. Ashraf, A. Fatima, "Exploring the potential of secondary particulate formation from the photochemical degradation of amines employed for CO₂ capture", June 2021, International Conference on Advances in Chemical Engineering and Sciences (ICACES)

- Shahzad*, R. M. Saleem, I. Aziz, A. Ahsan, M. A. Hussain, A. N. Tabish, **H. Zeb**, "Production of bio oil from Tamarix aphylla (Khagal) plant and lignite coal blend using microwave pyrolysis", June 2021, International Conference on Advances in Chemical Engineering and Sciences (ICACES)
- S. Abbas, Z. B. Babar*, M. A. Hussain, A. Saeed, M. K. Khan, **H. Zeb***, "Investigating SO₂, NO_x, CO₂ and particulate emissions from pulverized combustion of coal blends using drop tube furnace", March 2021, International Conference on Energy, Water and Environment – ICEWE - 321
- M. Asif, M. A. Hussain*, A. N. Tabish, H. Sattar, Z. B. Babar, M. K. Khan, R. M. Saleem, A. Riaz, **H. Zeb***, "Investigation of kinetic and thermodynamic parameter of sapodilla leaves pyrolysis by using Coats Redfern method", March 2021, International Conference on Energy, Water and Environment – ICEWE -141
- Z. B. Babar, A. Waqas, R. M. Saleem, A. Fatima, M. S. Akram, R. Haider, H. Sattar, **H. Zeb***, "Optimizing design and process parameters to improve thermal efficiency of domestic gas stove burners", March 2021, International Conference on Energy, Water and Environment – ICEWE - 152
- **H. Zeb**, "Biomass potential towards energy production in modern era", Oct 2018, International Conference on Modern Trends in Chemistry and Energy Technologies, Lahore. Pakistan.
- **H. Zeb**, J. Kim, "Macroalgae biomass (Saccharina japonica) liquefaction using supercritical alcohol", Apr 2017, Spring Conference of Korean Institute of Chemical Engineers, Jeju, Korea
- **H. Zeb**, J. Kim, "Effect of reaction conditions on liquefaction yield of algal biomass", Apr 2016, Spring Conference of Korean Institute of Chemical Engineers, Changwan, Korea
- **H. Zeb**, J. Kim, "Understanding the effect of biomass-to-solvent ratio for biomass liquefaction in supercritical alcohol", Oct 2015, 9th International Symposium on Supercritical Fluids, Seoul, Korea
- **H. Zeb**, J. Kim, "Beneficial role of supercritical ethanol as a solvent for algal biomass liquefaction", Oct 2015, 9th International Symposium on Supercritical Fluids, Seoul, Korea
- **H. Zeb**, J. Kim, "Supercritical ethanol as a solvent for liquefaction of carbohydrate-rich macroalgae", Jun 2015, 23rd European Biomass Conference & Exhibition, Vienna, Austria
- **H. Zeb**, J. Kim, "Supercritical ethanol; A promising solvent for algal biomass liquefaction", Nov 2014, 10th International Conference on Separation Science and Technology (ICSST14), Nara, Japan
- **H. Zeb**, J. Kim, "Liquefaction of algal biomass in supercritical ethanol", Jul 2014, International Symposium on Advances in Supercritical Fluids (ISASF), Seoul, Korea

Thesis Supervised

	Topic	Year
M. Sc. (18 years)	Simulation Study of Hydrogen Based Proton Exchange Membrane Fuel Cell for Performance Optimization	2023
	A Thermo- Mechanical Characteristic Study of Compressive Pallets Made from Chamalang Coal and Cow Dung Blends	2022
	The Study of Thermal Degradation and Kinetic Behavior of Orange Leaves by Using Coats Redfern Model	2022
	Simulation study of syngas production potential of low rank coals in Pakistan using Aspen Plus	2022
	Production of hydrogen from low rank coal using process integration framework between syngas production process techno-economic analysis	2021
	Study of adsorptive capacities of mixed tree leaves-based biochar for arsenic removal	2021
	Greener synthesis of graphene quantum dots from indigenous coal	2021

A thermo- mechanical characteristic study of compressive pallets made from chamalang coal and cow dung blends	2021
Comparison of organic binders (molasses and cow dung) on the physicochemical properties of rice husk-based biomass pallets	2021
Investigation of kitchen waste as an efficient biochar catalyst holds for CO ₂ methanation	2021
A TGA-DSC study of thar brown lignite to understand the behavior of water forms & their subsequent impact on utilization	2021
Influence of design and operating parameters on efficiency and emissions of domestic atmospheric gas burner	2021
Thermal degradation behavior & kinetics modeling study of Khagal (Tamarix Aphylla) woody biomass	2021
TGA study of chamalang coal blends with unwashed and washed sugarcane bagasse aiming to minimize the slagging, fouling risk potential on combustion	2021
The study of thermal degradation and kinetic behavior of sunflower stalk by using Coats Redfern Model	2021
Optimization of saccharification and fermentation conditions for production of bioethanol from biodegradable kitchen waste	2021
Co-Combustion study of Thar coal blends with petroleum coke using the Thermogravimetric analysis technique	2021
Co-liquefaction study of wheat straw and solid plastic waste for the production of liquid fuels	2021
Fate of heavy metal during pyrolysis of municipal solid waste of Mahmoodboti (Lahore)	2021
Potential of floating solar PV and uninterrupted clean energy using pumped hydro energy storage in Pakistan	2021
Adaptive fuzzy based maximum power point tracking for photovoltaic grid connected system under changing weather condition	2021
Simulation of multistage flash distillation unit, desalination of sea water	2021
Study of bio-oil production from sewage sludge of a municipal wastewater treatment plant using hydrothermal liquefaction (HTL)	2020
Microwave assisted vacuum pyrolysis of thar coal and waste of jeans blends	2020
Production of bio-oil from Tamarix Aphylla (Khagal) plant and lignite coal blend using microwave pyrolysis	2020
A Study on Activated Carbon Characteristics Produced from the Chamalang Coal & Sugarcane Bagasse	2020
Co-Pyrolysis Study of Chamalang Lignite with Saw Dust	2020
Energy conservation buildings of the modern era	2020
Optimization of design and process parameters to improve combustion efficiency and to reduce pollution emissions for domestic gas burners	2019

The effects of coal blends and oxy-fuel combustion on the emission of particulate matter, SO _x and NO _x during pulverized coal combustion in drop tube furnace	2019
Microwave Assisted Vacuum Pyrolysis of Lignite Coal and Castor Oil Seeds (<i>Ricinus Communis</i> L.) Blends	2019