PERSONAL DETAILS

Luckman Muhmood

303, Akashdeep

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Mobile: +91-9969757811

Google Scholar Profile

Date of Birth: 30-06-1977

EDUCATION AND DEGREES

KTH , Stockholm, SWEDEN

Ph.D in Materials Process Science **10-12-2010**

Thesis : Investigations of Thermophysical Properties of Slags with focus on Slag-Metal Interface

Indian Institute of Technology -Bombay, Mumbai, INDIA

M-Tech in Process Metallurgy **20-07-2007**

Thesis: Effect of Iron and Steel making slags on the Pozzolanic Activity of Cements

Calicut University, Kerala, INDIA

B-Tech in Mechanical Engineering **10-10-1999**

CURRENT POSITION

Professor, Mechanical Engineering, Somaiya Vidyavihar University **17-12-2017 – Present**

- ✓ Taught courses like Materials Science and Metallurgy, Production Process for Undergraduates (UG) and Hydrogen Energy & Fuel Cells and Alternate Fuel Technologies for Post Graduates (PG)
- ✓ Developed the Metallurgy Laboratory to cater both UG and PG courses and Project works
- ✓ Developed High Temperature Processing Lab for research work focusing on thermophysical properties of molten slags and salts

PREVIOUS WORK EXPERIENCE

Somaiya Vidyavihar University, Mumbai, INDIA

Associate Professor, Mechanical Engineering **09-2014 – 12-2017**

CSIRO, Clayton, AUSTRALIA

Post Doctoral Fellow , Process Science and Engineering **08-2011 – 08-2014**

- ✓ Involved in Dry Slag Granulation project for recovering waste heat from slags
- ✓ Designed and Fabricated a unique cross-tube furnace to observe jet formation and droplet formation of molten slags using high speed videography

Aditya Birla Science and Technology Co. Ltd., Taloja, INDIA

Deputy Manager (R&D), Birla Copper **02-2011 –07-2011**

- ✓ Involved with Birla Copper Research and Development

- ✓ Planned for setting up a high temperature lab for studying copper slag and matte properties and other phenomena

Essar Steel Ltd. Surat ,INDIA

Senior Engineer (R&D), MIDREX and EAF **08-2007 – 08-2008**

- ✓ Involved in Steel research and implemented a few project at plant level like recycling of anthracite fines in Electric Arc Furnace, Lignite Coal Gasification etc.

MES College of Engieering, Kuttippuram, Kerala, INDIA

Lecturer , Mechanical Engineering **04-2002 – 07-2005**

Involved in teaching and learning process for Mechanical Engineering

- ✓ Served various positions like Deputy Warden of Boys Hostel, Examination Committee Member, Indian Society for Technical Education Chapter Secretary etc.

Government Polytechnic College, Periye ,Kerala, INDIA

Lecturer , Mechanical Engineering **08-2000 – 04-2002**

- ✓ Taught subjects related to Mechanical Engineering

LANGUAGE SKILLS

English – Speak fluently, writing with high proficiency

Hindi - Speak fluently, writing with basic competence

Malayalam – Speak fluently

RESEARCH EXPERIENCE AND RESEARCH COOPERARTION

Thermophysical property measurements are of utmost importance for understanding the heat and mass transport phenomena of various processes. Measurements of these are extremely challenging at high temperature owing to the high reactivity between materials at these elevated temperatures. My work focuses on measuring density, viscosity, surface tension, diffusivity and other important properties of slags, salts as well as metals at elevated temperatures. This works is of relevance for metal making , solar thermal power plants and other high temperature applications. My areas of research interest are **High temperature thermophysical property measurements of slags, salts and metals, Heat recovery and Value addition of industrial wastes and Solid Oxide Fuel Cells.** I have been collaborating with the following research groups:

Prof. Seshadri Seetharaman, Materials Process Science, KTH Sweden

Dr. Rajakishora Lenka, Powder Metallurgy Group, BARC, India

Dr. Alex Deev, High Temperature Processing Group, CSIRO Australia

ACADEMIC PUBLICATIONS

Peer reviewed manuscripts and articles (communicated and published)

1. V Shrotri and L Muhmood, "Experimental and Modelling studies on Density of $Ca(NO_3)_2$-$NaNO_3$-KNO_3 ternary salts with focus on Calcium nitrate density prediction", *Accepted. International Journal of Thermophysics*, **2020**.

2. V Shrotri and L Muhmood, “Application of Geometric Modelling for calculation of viscosity and density of $LiNO_3$ and $CsNO_3$ based ternary nitrate salt systems”, CALPHAD, 68, **2020,** 101749.
3. LJ Wang, NN Viswanathan, L Muhmood, E Kapilashrami, S Seetharaman, “Some aspects of interfacial phenomena in steelmaking and refining”, 47 (4), Metallurgical and Materials Transactions B, pp: 2107-2113, **2016.**
4. M Wegener, L Muhmood, S Sun, AV Deev, “Surface Tension Measurements of Calcia-Alumina Slags: A Comparison of Dynamic Methods”, 46 (1), Metallurgical and Materials Transactions B, pp: 316-327, **2015.**
5. M Wegener, Luckman Muhmood, Shouyi Sun and Alex V Deev,” Formation and breakup of molten oxide jets under periodic excitation”, AIChE, 60(9), pp. 3350-3361, **2014**.
6. Till Kyulmer, Mirco Wegner, Luckman Muhmood, Shouyi Sun and Alex V Deev, “Controlled disintegration of multiple jets of molten slags”, ISIJ, 52(12), **2014.**
7. Mirco Wegner, Luckman Muhmood, Shouyi Sun and Alex V Deev, “Formation and breakup of molten oxide jets”, Chemical Engineering Science, 105, pp. 143-154, **2014**.
8. Mirco Wegner, Luckman Muhmood, Shouyi Sun and Alex V Deev, “A novel high temperature experimental setup to study the dynamics interfacial phenomena in slags”, Industrial and Engineering Chemistry Research, 52 (46), pp. 16444-16456, **2013**.
9. Luckman Muhmood, Anna Semykina and Seshadri Seetharaman, “Some novel studies of thermodynamics, kinetics and transport phenomena in slags", High Temperature Materials and Processes, Vol. 31 (4-5), pp. 351-358, 2012. **2012**.
10. W.Cao, Luckman Muhmood and Seshadri Seethraman, “Sulfur transfer at Slag/Metal Inteface – Impact of Oxygen potential”, Metallurgical and Materials Transactions B, Volume 43, Number 2, 363-369, **2012.**
11. Luckman Muhmood, N.N. Viswanathan and Seshadri Seethraman, “Studies of dynamic mass transfer at the slag-metal interface – Interfacial velocity of oxygen”, Int. J. Mat. Res., 103(7), pp. 875-883, **2012**.
12. Luckman Muhmood, N.N. Viswanathan and Seshadri Seethraman, “A new approach for the diffusion coefficient evaluation of sulfur in $CaO\text{-}SiO_2\text{-}Al_2O_3$ slag”, Defect and Diffusion Forum, 312-315 , 626-634 , **2011**.
13. Luckman Muhmood, “A new insight to interfacial phenomena occurring at slag-metal interfaces”, Steel Res. Intl., 82(12), 1375-1384, **2011**.
14. Luckman Muhmood, N.N. Viswanathan and Seshadri Seethraman, “Some Investigations into the dynamic mass transfer at the slag-metal interface using sulfur: Concept of Interfacial velocity”, Metallurgical and Materials Transactions B, Volume 42, Number 3, 460-470, **2011**.
15. Luckman Muhmood, N.N. Viswanathan, Masanori Iwase and Seshadri Seethraman, “Evaluating the Diffusion Coefficient of Sulfur in low silica CaO-SiO2-Al2O3 Slag”, Metallurgical and Materials Transactions B, Volume 42, Number 2, 274-280, **2011**.
16. Luckman Muhmood, N.N. Viswanathan and Seshadri Seethraman, “A proposal for a novel method to measure the diffusivity of species in slag”, Metallurgical and Materials Transactions B , Volume 42, Number 2, 393-399, **2011.**
17. Luckman Muhmood and Seshadri Seethraman, “Density Measurements of low silica CaO-SiO2-Al2O3 slags”, Metallurgical and Materials Transactions B, Volume 41, Number 4, 833-840, **2010.**
18. Luckman Muhmood, Satish Vitta and D. Venkateswaran, “Cementitious and pozzolanic behavior of Electric Arc Furnace steel slags”, **Cement and Concrete Research**, Volume 39, Issue 2, Pages 102-109, **2009**.

Peer reviewed conferences and posters

Posters

1. Varun Shrotri and Luckman Muhmood,"Density and Viscosity measurements of $Ca(NO_3)_2$-$NaNO_3$-KNO_3 ternary salt systems", IRAMC 2019, SRM University, Chennai, Feb 2019.

International Conferences

1. Lionel d'souza, Luckman Muhmood and Lenka R K, "Effect of Cu addition on the electrochemic al performance of LaNi0.6Fe0.4O3 cathode materials for SOFC applications", APMA 2019, Pune, Feb. **2019**.
2. Lokesh Bele, Lenka R K , Patro P K, Muhmood L , T Mahata and Sinha P K, "Performance evaluation of Mn and Fe doped $SrCo_{0.9}Nb_{0.1}O_{3-\delta}$ cathode for IT-SOFC application", IOP Conference Series – Materials Science and Engineering, 310 (**2018**), 012107.
3. Luckman Muhmood, Mirco Wegner, Shouyi Sun and Alex V Deev," Surface tension studies of molten CaO-Al_2O_3 jets – Oscillating Jet Method ", 5th International Slag Valorization Symposium, Leuven, Belgium, April 3-5, **2017**.
4. Hema Tiwari, R K Lenka and Luckman Muhmood, "Synthesis and Fabrication of Molybdenum Doped Ni- YSZ Anode Material for IT-SOFC Applications", IUMRS-ICYRAM 2016, December **2016**, IISc Bangalore
5. Vivek Patel, R.K Lenka, P.K.Patro, Amit Shah, **L Muhmood**, T. Mahata and P.K Sinha," Electrochemical performance evaluation of Nd1.7Sr0.3NiO4 as a cathode for IT-SOFC applications", **International Conference on Powder Metallurgy & Particulate Materials (PM-16)**, February **2016**,Pune.
6. **Luckman Muhmood**, Mirco Wegner, Shouyi Sun and Alex V Deev," Control of molten CaO – Al_2O_3 oxide jets with focus on thermophysical property measurements and some limitations", **MOLTEN-2016**, Seattle, US, May 22-26, 2016.
7. **Luckman Muhmood**, N.N. Viswanathan and Seshadri Seetharaman, "Modelling and Experimental studies of Diffusivity of sulphur and its relevance in observing surface oscillations at the slag metal interface through X-ray imaging" **MOLTEN-2016**, Seattle, US, May 22-26, 2016.
8. **Luckman Muhmood**, N.N. Viswanathan and Seshadri Seetharaman, "Modelling and Experimental studies of Diffusivity of sulphur and its relevance in observing surface oscillations at the slag metal interface through X-ray imaging" **MOLTEN-2016**, Seattle, US, May 22-26, **2016**.
9. Lijun Wang, N N Viswanathan, Luckman Muhmood, Era Kapliarashmi and Seshadri Seetharaman ,*"Some aspects of interfacial phenomena in steelmaking and refining*", , CTSSC-EMI Symposium , September **2015**, Tokyo, Japan.
10. Mirco Wegener, Luckman Muhmood , Shouyi Sun and Alex Deev ,"Towards a slag droplet heat exchanger- capillary break up from molten oxide jets", , 5th Annual High Temperature Processing Symposium , 3-4 February **2014**; Swinburne University of Technology, Hawthorn, Vic, Australia.
11. Luckman Muhmood, Lijun Wang and Seshadri Seetharaman, "Studies of the properties of slag towards applications", Science and Technology of Ironmaking and Steelmaking, CSIR-NML International Conference, December **2013**, Jamshedpur India.
12. Luckman Muhmood and Mirco Wegener , "Experimental investigations on the dynamics of interfacial phenomena in synthetic blast furnace slags", 4th Annual High Temperature Processing Symposium , 4-5 February **2013**; Swinburne University of Technology, Hawthorn, Vic, Australia. 74-75.
13. Luckman Muhmood, N.N. Viswanathan and Seshadri Seethraman , "Evaluating the Chemical Diffusion Coefficient of Sulfur in slag by metal analysis: Model Concept and Experiments",

Ninth International Conference on Molten Slags, Fluxes and Salts, Beijing, China, May 27-30, (W052), **2012**.

14. Luckman Muhmood, N.N. Viswanathan and Seshadri Seethraman, "Concepts and Measurement of Velocities and Viscosities at the Slag-Metal Interface", Ninth International Conference on Molten Slags, Fluxes and Salts, Beijing, China, May 27-30, (W053), **2012**.
15. Luckman Muhmood, Lijun Wang and Seshadri Seethraman, "Density measurements of low silica CaO-SiO_2-Al_2O_3 slags: slag structure discussions", Ninth International Conference on Molten Slags, Fluxes and Salts, Beijing, China, May 27-30, (W054), **2012**.
16. Aida Abbasalizadeh, Luckman Muhmood ,Alexander McLean and Seshadri Seetharaman, "A sessile droplet study of iron-carbon-sulfur alloys on alumina substrate", Ninth International Conference on Molten Slags, Fluxes and Salts, Beijing, China, May 27-30, (W108), **2012**.
17. Weimin Cao, Luckman Muhmood and Seshadri Seetharaman, "Investigation of the impact of oxygen potential on sulfur mass transfer at slag/iron interface", Ninth International Conference on Molten Slags, Fluxes and Salts, Beijing, China, May 27-30, (W072), **2012**.
18. Luckman Muhmood, "Molten Slag Density Measurements with Focus on Slag Structures", 4th Annual High Temperature Processing Symposium 2012; 6-7 February 2012; Swinburne University of Technology, Hawthorn, Vic, Australia. **2012**. 74-75.
19. Luckman Muhmood, and S.Seetharaman, "Determination of some thermophysical properties in slag or slag-metal systems", Seetharaman seminar; materials processing towards properties, Sigtuna, Sweden, 14-15 June, **2010**.
20. Luckman Muhmood, N.N Viswanathan and S.Seetharaman,'Evaluating the Diffusion Coefficient of Sulfur in CaO-SiO2-Al2O3 Slag', 6th International Conference on Diffusion in Solids and Liquids, Paris, France, 5-7 July, **2010**.
21. A.K Das, T. Bhaskar, L. Muhmood, "Zero Waste Management Journey at Essar Steel", International Seminar on Waste Management in Iron & Steel Industry, Rourkela, India, 9-10 May **2008**.
22. D. Venkateswaran, S.Vitta**,** L. Muhmood, "Treatment & characterization of Electric Arc Furnace Slag (EAF) for its effective utilization in cementitious products", published in the Global Slag Magazine, October, **2007**.
23. D. Venkateswaran, S.Vitta and L. Muhmood, "Use of Electric Arc Furnace slag for Cementitious Products", Tenth NCB International Seminar on Cement and Building Materials, held at New Delhi, India, 27-30 November, **2007**.
24. L. Muhmood, S.Vitta and D. Venkateswaran, "Treatment and charecterization of Electric Arc Furnace Slag for Cementitious properties presented at R'07 World Congress, Davos, Switzerland, September 3-5, **2007**.
25. L. Muhmood, S.Vitta and D. Venkateswaran, "An Investigation into the use of Electric Arc Furnace Slag as Cementitious Material", International Seminar on Mineral Processing Technology (MPT-2007), at IIT Bombay, 23-24 February, **2007**.
26. D. Venkateswaran, S.Vitta and L. Muhmood, "Treatment & characterization of Electric Arc Furnace Slag (EAF) for its effective utilization in cementitious products" presented in the Second Global Slag Conference, held at Bangkok, Thailand, 20-21 November, **2006**.

Thesis

1. Luckman Muhmood, "Investigations of Thermophysical Properties of Slags with focus on Slag-Metal Interface", PhD Thesis, Royal Institute of Technology (KTH), Stockholm, Sweden, 2010.
2. Luckman Muhmood, "Effect of Iron and Steel making slags on the Pozzolanic Activity of Cements", M-Tech Thesis, Indian Institute of Technology (IIT) Bombay, Mumbai, India, 2007.

EXPERT ASSESSMENTS

- ✓ 29 reviewer assignments for International Journals **2011-2019**
- ✓ Session Chairman for International Conference (TRIBOINDIA-18) at VJTI Mumbai **2018**
- ✓ Invited as guest reviewer for the 3rd National Plan for Research, Development and Innovation for the period 2015-2020 (PNCDI III), organized by the Ministry of National Education and Scientific Research , Romania, **2015**
- ✓ PhD Topic Approval Examination of Sunaina Dayal at Monash University, Calyton, Australia **2013**
- ✓ Invited as an external reviewer for the National Research Council, Romania , **2012**

RESEARCH FUNDING – HONORS AND SCIENTIFIC GRANTS

- ✓ Awarded DST-SERB – Core Research Grant for the project titled "Oxide Mixtures as heat transfer fluids in Concentrating Solar Power Plant", Amount – INR 32,51,600/-, **2017**
- ✓ Awarded the TMS Extraction and Processing Metallurgy Science Award 2017, San Diego, USA, **2017**
- ✓ Awarded UGC Travel Grant of INR 1,82,000/- for attending Slag Valorization Symposium at Leuven, Belgium,**2017**
- ✓ Awarded CSIRO top up Research Grant of AUD 39,000/- for design and fabrication of an assembly for forming molten oxide fluid jets, **2014**
- ✓ Won the best paper award by a postdoctoral fellow at CSIRO, Australia in February, **2014**
- ✓ One of the final nominees for the Henry Marion Howe/Marcus A Grossman Young Author Award by ASM International in the year **2012**.
- ✓ Awarded the 12th Willy Korf Award for young excellence at the AMM Steel Success Strategies Congress (SSS XXVI), at New York, USA, **2011**.
- ✓ Awarded C J Yngström scholarship for conducting research work at Carnegie Mellon University, Pittsburgh ,USA, **2010**

TEACHING AND SUPERVISION

Pedagogical Methods

- ✓ Aluminium Metallurgy for the Industry – 2 day course orgainzed by ASM International India Chapter, **2019**
- ✓ Nanoscience and Nanotechnology – Fundamentals, Synthesis and Applications, 5 day course at VJTI Mumbai, India, **2017**
- ✓ Working with People (3 day course) at CSIRO, Melbourne, Australia, **2012**.
- ✓ Publishing with Impact (2 day course) at CSIRO, Melbourne, Australia, **2012**.
- ✓ Project Management Fundamentals (2 day course) at CSIRO, Melbourne, Australia, **2013**.
- ✓ Thermocalc Software, 5 day course at KTH Stockholm, Sweden, **2009**

Experience in Teaching and Supervision

Since 2014, I have been teaching the course on Materials Science & Metallurgy for the undergraduates at KJ Somaiya College of Engineering. I have also been teaching Hydrogen Energy and Fuel Cells for the Post Graduates as part of their Energy Engineering program. I am also the lab in charge for Metallurgy and have developed the following capabilities in the laboratory through internal and external fundings:

1. Metallographic specimen preparation and microstructure analysis using Image Analysis Software
2. Heat treatment facilities of steels and aluminium
3. Thermophysical Property measurement (density , viscosity, TGA) of molten liquids
4. Surface Tension of liquids (both molten and room temperature)
5. Electrolysis of molten salts to produce metal doped CNT's
6. Pin on Disc Tribometer

I had also taught a Master Course on Experimental Methods for international students at KTH Sweden in 2009.

I have also supervised students for their Bachelor (total 6 projects) and Master Degree Projects (total 9 projects).

Development of Teaching Material and use of Education Technology

I have developed teaching material for the course on Materials Science & Metallurgy for Under Graduates and Hydrogen Energy and Fuel Cells course for the Post Graduates. The latter course is a new course with the University. A mix of power point slides, videos and white board was used in teaching them. This helps them to visualize the concepts more clearly as a result of which I have been getting good feedback from the students.

Software Skills

FactSage – basic level

Thermocalc – basic level

Development in Teaching

I work in an Academically Autonomous College whose syllabus get revised every 4 years. I am currently the Manufacturing and Allied stream Area coordinator as part of our syllabus revision for the College. I coordinate 14 teachers related to subjects in this stream. We develop the sequence of subjects that the students need to study for their Undergraduate course. Currently this is implemented from 2019 onwards.

Course and other Evaluation

I am associated with the evaluation of the courses that I teach. In this regard I ask conceptual questions which test their understanding.

I have been working with people from diversified culture and disciplines during my work in Sweden as well as in Australia. In Sweden, I taught for the mater students as well as conducted laboratory session for the Undergraduate students. I had many team members for China, Egypt, Ukraine, Poland etc. in my group. I used to help most of them in planning their experiments as well as personally, in terms of arranging accommodation. In Australia, I was guiding a Iranian student from UNSW.

ADMINISTRATION AND POSITION OF TRUST

Administration

- ✓ Area Coordinator (Manufacturing and Allied) – 2016 onwards
- ✓ Department Planning Committed Member – 2018 onwards
- ✓ Department Feedback Coordinator – 2016 onwards

Position of Trust

- ✓ Invited as guest reviewer for the 3rd National Plan for Research, Development and Innovation for the period 2015-2020 (PNCDI III), organized by the Ministry of National Education and Scientific Research , Romania, **2015**
- ✓ Invited as an external reviewer for the National Research Council, Romania , **2012**