Dr Syed Sheraz Daood

BSc, MSc, PhD

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Profile:

Sheraz is an Assistant Professor in the Institute of Chemical Engineering and Technology at the University of the Punjab and brings over 18 years of experience while working in industry and academia. He has responsibilities to teach and facilitate research at the graduate, postgraduate and post-doctorate levels. He is also an active reviewer for the research projects submitted to various international funding agencies alongside peer-reviewing International journals. Sheraz has received national and international recognition awards for his research and academic contribution to the University of the Punjab (PK), University of Leeds (UK) and University of Sheffield (UK). His research interests include generation of fundamental and pilot-scale research data in the field of renewable engineering, catalysis, thermo-chemical metal corrosion, carbon capture and utilisation, emission reduction, chemical reaction engineering, liquid-liquid extraction and waste to heat/power generation. Investigation interests also include troubleshooting of process-based engineering anomalies related to additive based industries. Actively self-motivated and able to collaborate with other partners in the write up of research funding applications to the British Council, Higher Education Commission, Pakistan Science Foundation, Engineering and Physical Sciences Research Council (EPSRC), International / local Industry and other funding bodies. Sheraz has contributed (in some key projects worked as technical lead) to the projects at the University of Sheffield and University of Leeds (UK) totalling to an overall amount of £2.98M.

He is a Chemical Engineer with 1st Class BSc and MSc degrees with merit distinctions and three Gold medals for his academic performance. A period in the industry followed working as Chemical Engineer in a Gas Transmission Company after BSc. He later returned to academia to take up a lecturing post in Chemical Engineering and competed to secure a PhD scholarship to study in the UK. He gained his PhD from the School of Chemical and Process Engineering, University of Leeds, UK in 2011. A period interfacing industry with academia as a KTP Research Fellow / Process Development Engineer followed, after his PhD, when he co-invented a process to reduce pollutant emissions, corrosion with increase thermal efficiency of the boiler. The planning and successful execution of this process was demonstrated on a full-scale plant followed by retrofitting and testing it as a hybrid technology with other emission reduction technologies. This KTP project has been graded "outstanding" by technology strategy board (TSB) of the UK. The catalyst developed was also patented as part of a process patent in the UK (GB2516728). The same project was also recognised by the UK Trade and Investment department and by Lord Stephen Green (Minister of State for Trade and Investment in 2014).

Areas of Research

Sheraz's research career expands to the optimisation and operation of processes encompassing renewable engineering, catalysis, thermo-chemical metal corrosion, carbon capture and utilisation, emission reduction, chemical reaction engineering, liquid-liquid extraction, waste to heat/power generation, few of these are directly linked to reinforce the clean sustainable energy technologies. Investigation interests also include troubleshooting of process-based engineering anomalies related to additive based industries.

He is currently co-supervising 2 International PhD students besides involvement in teaching heat transfer, renewable energy engineering and particulate technology subjects at the Institute of Chemical Engineering and Technology, University of the Punjab. He has also delivered lectures at the University of Sheffield, UK in the subjects of fuel and energy utilisation, catalysis, combustion theory and design, carbon capture utilisation and storage, global energy systems to the undergraduates and postgraduate students. He has contributed significantly to the group activity in co-authorship of research articles and successful completion of research projects.

He is presently engaged in planning and executing the experimental research projects taking place at the University of the Punjab in collaboration with international collaborators and partners from Europe and East Asia.

Research Projects

- Royal Academy of Engineering funded project (Newton: £50,000): Waste to Energy-Investigation of municipal solid waste blending effect on reactivity of coals in circulating fluidized bed combustion and gasification processes (2016-2019).
- British Council Pakistan and Higher Education Commission funded project (£29,000): Researcher links UK-PK. (2017-Jan 2019).
- EPSRC funded project (# EP/M01536X/1; £1,033,385): Ultra-Supercritical (USC) steam power generation technology with Circulating Fluidized Bed (CFB): Combustion, Materials and Modelling (April 2015-Nov 2018).

- British Council Pakistan / Higher Education Commission funded project (#152802: £60,000): Knowledge economy partnerships with Pakistan Institute of Engineering and Applied Sciences (PIEAS) (2015- 2018).
- UKCCS project (Grant No. UKCCSRC-C1-27; £167,000): Experimental investigation with PACT facility and CFD modelling of oxy- coal combustion with recycling real flue gas (2015-2017).
- Industrial grants (#143293-145495; £40,000, £16,739): Thermo-chemical corrosion degradation research project on fire-side corrosion of the boiler tubes (Feb 2015- Nov 2017).
- British Council Pakistan / High Education Commission funded project (#143295: £86,000): International Strategic Partnership in Research & Education Project involving the University of Leeds, PIEAS, University of the Punjab and British Council (2011-2015).
- TSB Knowledge Transfer Partnership (TSB/KTP008393: £137,000): Development of fuel enrichment technology (2012-2014)

Awards (National/International), Achievements and Memberships

- Achievement, International. Certificates of contribution in Reviewing Journals i.e. Fuel; Applied Thermal Engineering; Energy Conversion and Management; Energy; Journal of Analytical and Applied Pyrolysis; Powder Technology.
- Achievement, International. Appreciation letter from Prof Jim Lister (Head of Department, Department of Chemical and Biological Engineering, University of Sheffield, United Kingdom) received in recognition of the dedication to teaching and learning in the provision of CPE 6300 module to the Department of Chemical and Biological Engineering undergraduate students.
- Achievement, International. Recognition of contribution to the CPE 604 module received from Centre of Doctoral Training Manager of Engineering and Physical Sciences Research Council, Department of Chemical and Biological Engineering, University of Sheffield, United Kingdom.
- Recognition Award by the University of Sheffield for successfully applying for a UK patent and working to maintain excellent working relationships with Industrial Partner.
- KTP (Knowledge Transfer Partnerships) Certificate of Excellence from Technology Strategy Board UK.
- Naz memorial Gold Medal / Pakistan State Oil Gold Medal / Qarshi Industries Gold Medal.
- BSc and MSc Merit Certificates.
- Achievement, National. Appreciation letter from Lt Gen (R) Arshad Mahmood (Vice Chancellor- 2002) congratulating on securing first position in B.Sc. Chemical Engineering.
- Chartered Institute of Environmental Health Level 2 Award in Health and Safety in the Workplace.
- Member of Pakistan Engineering Council (Life time member)
- Member of Pakistan Institute of Chemical Engineers (Associate Member- Life time)
- Energy Institute: date of joining: 03/10/2015 to date (membership fee needs to be paid for 2019 year)
- Institute of Chemical Engineers: date of joining: 17/12/2012 to 01/12/2018

Patent:

- Fuel enrichment process. GB2516728 (UK). Appl. 13 Jan 2016.

Journal articles

- Daood SS, Yelland TS, Szuhanszki J, Pourkashanian M & Nimmo W (2019) Experimental investigation of NO reburning during oxy-coal burner staging. *Energy and Fuels*.
- Morris J, Daood SS, Chilton S & Nimmo W (2018) Mechanisms and Mitigation of Agglomeration during Fluidized Bed Combustion of Biomass: A Review. *Fuel*, 230, 452-473.
- Daood SS, Yelland T & Nimmo W (2017) Selective non-catalytic reduction – Fe-based additive hybrid technology. *Fuel*, 208, 353-362.
- Bai X, Lu G, Hossain MM, Szuhanszki J, Daood SS, Nimmo W, Yan Y & Pourkashanian M (2017) Multi-mode combustion process monitoring on a pulverised fuel combustion test facility based on flame imaging and random weight network techniques. *Fuel*, 202, 656-664.
- Daood SS, Ottolini M, Lu G, Taylor S, Ogunyinka O, Hossain MM, Yan Y & Nimmo W (2017) Pollutant and Corrosion Control Technology and Efficient Coal Combustion. *Energy & Fuels*, 31(5), 5581-5596.
- Rizvi AH, Daood SS, Javed MT, Munir S, Pourkashanian M & Nimmo W (2015) Reactivity Analysis of Pakistani Thar Lignite Reserves in Oxidizing Thermogravimetric Analysis Atmospheres. *Energy & Fuels*, 29(8), 5349-5360.
- Rizvi T, Xing P, Pourkashanian M, Darvell LI, Jones JM & Nimmo W (2015) Prediction of biomass ash fusion behaviour by the use of detailed characterisation methods coupled with thermodynamic analysis. *Fuel: the science and technology of fuel and energy*, 141, 275-284.
- Pickard SC, Daood SS, Pourkashanian M & Nimmo W (2014) Co-firing coal with biomass in oxygen- and carbon dioxide-enriched atmospheres for CCS applications. *Fuel*, 137, 185-192.
- Pickard S, Daood SS, Pourkashanian M & Nimmo W (2014) Reactivity during bench-scale combustion of biomass fuels for carbon capture and storage applications. *Fuel*, 134, 171-179.
- Daood SS, Ord G, Wilkinson T & Nimmo W (2014) Fuel additive technology – NOx reduction, combustion efficiency and fly ash improvement for coal fired power stations. *Fuel*, 134, 293-306.
- Daood SS, Ord G, Wilkinson T & Nimmo W (2014) Investigation of the Influence of Metallic Fuel Improvers on Coal Combustion/Pyrolysis. *Energy & Fuels*, 28(2), 1515-1523.
- Daood SS, Javed MT, Rizvi AH & Nimmo W (2014) Combustion of Pakistani Lignite (Thar Coal) in a Pilot-Scale Pulverized Fuel Down-Fired Combustion Test Facility. *Energy & Fuels*, 28(2), 1541-1547.
- Pickard S, Daood SS, Pourkashanian M & Nimmo W (2013) Robust Extension of the Coats–Redfern Technique: Reviewing Rapid and Realiable Reactivity Analysis of Complex Fuels Decomposing in Inert and Oxidizing Thermogravimetric Analysis Atmospheres. *Energy & Fuels*, 27(5), 2818-2826.
- Daood SS, Javed MT, Gibbs BM & Nimmo W (2013) NOx control in coal combustion by combining biomass co-firing, oxygen enrichment and SNCR. *Fuel*, 105, 283-292.

- Pickard S, Daood SS, Nimmo W, Lord R & Pourkashanian M (2013) Bio-CCS: Co-firing of Established Greenfield and Novel, Brownfield Biomass Resources under Air, Oxygen-enriched Air and Oxy-fuel Conditions. *Energy Procedia*, 37, 6062-6069.
- Daood SS, Nimmo W, Edge P & Gibbs BM (2012) Deep-staged, oxygen enriched combustion of coal. *Fuel*, 101, 187-196.
- Nimmo W, Daood SS & Gibbs BM (2010) The effect of O2 enrichment on NOx formation in biomass co-fired pulverised coal combustion. *Fuel*, 89(10), 2945-2952.
- Daood S, Munir S, Nimmo W & Gibbs BM (2009) Char oxidation study of Sugar cane bagasse, Cotton stalk, and Pakistani coal under 1% and 3% oxygen concentrations. *Biomass and Bioenergy*, 34, 263-271.
- Munir S, Daood S, Rizvi SUH & Butt M (2009) Development of an Inclined Plate Extractor-Separator for Immiscible Liquids. *Energies*, 2(4), 957-975.
- Munir S, Daood SS, Nimmo W, Cunliffe AM & Gibbs BM (2009) Thermal analysis and devolatilization kinetics of cotton stalk, sugar cane bagasse and shea meal under nitrogen and air atmospheres. *Bioresource Technology*, 100(3), 1413-1418.
- Daood SS, Ijaz A, Asghar HMA, Ali M & Butt MA (2008) Stability comparison of concentric tube bulb manometer with conventional U-shaped manometer. *Measurement*, 41(8), 934-939.
- Daood SS, Ijaz A & Butt MA (2007) Study on a Concentric Tube Bulb Manometer and its Performance Compared to U-shaped Manometer. *Sensors*, 7(11), 2835-2845.

Conference proceedings papers

- Yelland T, Daood SS, Szuhanszki J, Pourkashanian M & Nimmo W (2019). Impact of fuel additives on the fireside corrosion in pulverised fuel boilers: A thermodynamic investigation". Work presented at a poster presentation competition at the University of Sheffield, United Kingdom, 27th June 2019.
- Yelland T, Daood SS, Szuhanszki J, Pourkashanian M & Nimmo W (2019). The Impact of Burner Staging on NO Reburning during Oxy-coal Combustion. 9th International conference on clean coal combustion, Houston, Texas, USA. June 3-7, 2019.
- "Combustion of biomass pellets in a pilot scale bubbling fluidised bed combustor". Invited speaker at the workshop on Green energy and municipal solid waste management solutions, Nazarbayev University, Astana, Kazakhstan, 12th Sep 2018.
- "The effect of operational conditions on agglomeration in a fluidised bed combustor using biomass". 26th European Biomass Conference and Exhibition, Copenhagen, Denmark, 14th -17th May 2018.
- "The effects of operational variables on defluidisation in a fluidised bed biomass combustor". IFRF 2018 Conference- Clean, efficient and safe industrial combustion, Sheffield, UK, 30-31 May 2018.
- "Pilot-scale operational study of biomass usage in a fluidized bed combustor". 12th European Conference on Fuel and Energy Research and its Applications (12th ECCRIA), Cardiff, UK, 5th – 7th Sep 2018.
- "Minimising NO emissions from oxy-coal combustion: The impact of burner staging on NO reburning during oxy-coal combustion". 12th European Conference on Fuel and Energy Research and its Applications (12th ECCRIA), Cardiff, UK, 5th – 7th Sep 2018.
- "Novel hybrid NOx technology for pulverised coal combustion". UK-Pakistan Research Links Workshop, University of Cambridge, UK, 27th-28th March 2018.

- "The impact of burner staging on NO reburning in oxy-coal combustion". Invited speaker at the UK-Pakistan Research Links Workshop, University of Cambridge, UK, 27th-28th March 2018.
- Yelland TS, Daood SS, Szuhanszki J, Pourkashanian M & Nimmo W (2018) Experimental Investigation into Burner Staging during Oxy-coal Combustion. *ECCRIA 12*, 5 September 2018 - 7 September 2018.
- Morris J, Daood SS, Chilton S, Ng B & Nimmo W (2018) Pilot-scale operational study of biomass usage in a fluidized bed combustor. *ECCRIA 12*, 5 September 2018 - 7 September 2018.
- Yelland TS, Daood SS & Nimmo W (2018) SNCR-Fuel Additive Based Hybrid Technology for Low NOx Pulverised Coal Combustion. *ECCRIA 12*, 5 September 2018 - 7 September 2018.
- Yelland TS, Daood SS, Szuhanszki J, Pourkashanian M & Nimmo W (2018) Minimising NO emissions from oxy-coal combustion: The impact of burner staging on NO reburning during oxy-coal combustion. *IFRF 2018 Conference*
- Morris , Daood SS, Chilton S, Ng BJ & Nimmo W (2018) The effects of operational variables on defluidization in a fluidized bed biomass combustor.. *IFRF 2018*, 30 May 2018 - 31 May 2018.
- Morris J, Daood SS, Chilton S & Nimmo W (2018) The Effects of Operational Conditions On Agglomeration In A Fluidized Bed Combustor Using Biomass. *26th European biomass conference and exhibition (EUBCE)*
- White T, Birch B, Daood SS, Javed MT & Nimmo W (2017) Innovation in coal utilisation and promotion of modern mining practices in Pakistan: a new blended-learning course. *Going Global 2017*, 22 May 2017 - 24 May 2017.
- Al-Qayim K, Szuhanszki J, Daood SS, Nimmo W & Pourkashanian M (2016) Firing of 100% pulverized biomass in a 250 KW combustion test facility – effect of particle size on combustion performance. *NA*
- Stechly K, Clements A, Al-Qayim K, Alvarez Rodriguez A, Szuhanski J, Daood SS, Ingham D, Ma L, Nimmo W & Pourkashanian M (2016) CFD Predictions of Biomass Combustion in a 250 kW Combustion Test Facility. *NA*, 2 September 2016 - 7 September 2016.
- Ottolini M, Daood SS & Nimmo W (2016) Advanced NOx Control by Combining In-Furnace Fuel Additive Combustion Technology and SNCR. *NA*
- Ottolini M, Daood SS & nimmo W (2016) Fuel additive efficient coal combustion technology. *na*, 8 August 2016 - 12 September 2016.
- Ottolini M, Nimmo W & Daood SS (2016) Fuel additive efficient coal combustion. *33rd Annual International Pittsburgh Coal Conference: Coal - Energy, Environment and Sustainable Development, PCC 2016*, Vol. 2016-August
- Daood S, Ord G, Wilkinson T & Nimmo W (2014) Fuel Enrichment Clean Coal Technology for Improving Efficiency and Reducing Emissions. *10th European Conference on Coal Research and its Application*. University of Hull, 15 September 2014 - 17 September 2014. Daood S, Nimmo W, Ord G & Wilkinson T (2013) The investigation of an iron based Fuel Additive on improving NOx reduction, quality of fly ash and combustion efficiency for pulverised coal combustion. *6th International Clean Coal Technologies*. Thessaloniki, Greece, 12 May 2013 - 16 May 2013.
- Daood S, Nimmo W, Rizvi A, Tayyeb M, Ingham D & Pourkashanian M (2012) Reactivity analysis of Tharparkar lignite coal reserves of Pakistan under air, oxygen enriched air and oxy-fuel reaction atmospheres in Thermogravimetric analyser. *UK Pakistan Coal Conference*. University of Leeds, 3 July 2012 - 5 July 2012.

- Pickard S, Daood S, Nimmo W, Lord R, Szuhanszki J & Pourkashanian M (2011) Pilot-scale co-firing of brownfield biomass reserves under oxy-fuel conditions. *2nd Intl workshop on Biomass & Carbon capture and storage*. Cardiff, Wales, 25 October 2011 - 26 October 2011.
- Shafeeq A, Daood SS, Muhammad A & Ijaz A (2010) Effect of variable reflux ratio on binary distillation in a laboratory scale distillation column (pp 35-38)
- Daood S, Nimmo W, Ord G & Wilkinson T () Fuel Enrichment Clean Coal Technology for Improving Efficiency & Reducing Emissions. *ECCRIA 10, Hull 10th Sept 2014*, 8 September 2014 - 10 September 2014.
- Pickard S, Daood S, Pourkashanian M & Nimmo W () Oxygen-enriched co-combustion of biomass for CCS applications. *The 35th International Symposium on Combustion*. San Francisco, 3 August 2014 - 8 August 2014.
- Daood S, Nimmo W, ord G & wilkinson T () The investigation of an iron based Fuel Additive on improving NOx reduction, quality of fly ash and combustion efficiency for pulverised coal combustion. *6th Int. Clean Coal Technology Conference, Greece (Thessaloniki, 14-16th May 2013)*, 14 May 2013 - 16 May 2013.
- Daood S, Nimmo W, Rizvi A, Javed T, Ingham D & Pourkashanian M () Reactivity analysis of Tharparker lignite coal under air, oxygen enriched air and oxyfuel reaction atmospheres in a thermogravimetric analyser. *UK Pakistan Coal Conference*. Leeds, 3 July 2012 - 5 July 2012.
- Pickard S, Daood S, Nimmo W, Lord R, Pourkashanian M & Szuhanszki J () Pilot scale firing of brownfield biomass under oxyfuel conditions. *2nd Intl workshop on biomass, carbon capture and storage*. Cardiff, 25 October 2011 - 26 October 2011.
- Daood SS, Morris J, Chilton S & Nimmo W () Combustion of Biomass pellets in a Pilot Scale Bubbling Fluidised Bed Combustor. *Green Energy and Municipal Solid Waste Management Solutions*