

Arashdeep Singh

Combustion Gasification and Propulsion Laboratory / Centre for Sustainable Technologies

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Education Indian Institute of Science (IISc), Bengaluru, India Expected: February 2023
Ph.D., Engineering, CGPA: 8.2/10

- Thesis topic: Binary and multi-component gas separation: simulations, experiments, and development
- Advisors: Prof. S. Dasappa and Dr. L. N. Rao

Thapar University, Patiala, India September 2016
M.Eng., Thermal Engineering, CGPA: 8.9/10

- Thesis topic: An experimental investigation into diesel engine exhaust waste heat recovery for water purification
- Advisor: Prof. Sumeet Sharma

Giani Zail Singh-Punjab Technical University Campus, Bathinda, India July 2014
B.Tech., Mechanical Engineering, 79.8%

Technical Interests Hydrogen Generation, Gas Separation / Carbon Capture, Gasification, Renewable Energy, Alternate Fuels, Material Characterization, Process Design & Analysis

Skills

Computer language: Matlab

Document processing: Microsoft Office

Statistics, Modeling, and Simulation: SPSS, CEA, Fluent, Chemkin, Aspen

Instrumentation: GC/LC-MS, gas analyzer (NDIR, TCD, ParaMag), SEM, EDS, XRD, BET, Rheometer, DSC, Pycnometer, bomb calorimeter, TGA-DTG, ICP-MS/OES

Work Experience Ph.D. Candidate: Centre for Sustainable Technologies, IISc Bengaluru, August 2017 – Current

- Design and development of multi-specie gas separation system for hydrogen generation (PEMFC compliant) and stoichiometric adjustment (catalytic methanol synthesis)
- Gas contaminant analysis at the inlet and outlet of the separation unit
- Air separation for medical grade oxygen generation (IISc's response to Covid-19)
- Gasification of agro-residue for hydrogen-rich syngas production
- Charcoal generation via straw torrefaction: Green Hackathon (NTPC)

Project Associate: Combustion Gasification and Propulsion Laboratory, IISc Bengaluru, August 2016 – July 2017

- Activated charcoal generation via biomass gasification
- Plasma activation of water for antimicrobial, seed growth, and surface hygiene applications
- Design of boiler and superheater for 250 kg/h steam generation at 850°C
- Rural Hybrid Energy Enterprise Systems (RHEES) project for Indiganatta, Karnataka
- BS-VI overview, and strategies and technologies for its compliance (policy document)

Graduate Engineer Trainee: Diesel Loco Modernization Works (DMW), Patiala (Ministry of Railways, Government of India), July – December 2013

- Engine block manufacturing and rectification methods

Research Training

Relevant courses (Ph.D.) – Transport Processes, Thermodynamics, Mathematical Analysis of Experimental Data, Applied Combustion, Alternate Fuels for Reciprocating Engines, Electron Microscopy in Materials Characterization

Relevant courses (M.Eng.) – Statistical Methods and Algorithms, Advanced Fluid Mechanics, Finite Element Methods, Computational Fluid Dynamics, Renewable Energy Systems, Thermal Systems Modeling and Analysis

Electric Vehicles: A primer for beginner (training programme), IISc Bengaluru (March 2021)

iRASPA workshop, Delft University of Technology, Netherlands (January 2021)

Liquid Chromatography – Mass Spectrometry training, Waters India (December 2019)

Chemical plant design and ASPEN simulation, MSRIT Bengaluru (July – September 2019)
7th International Sotacarbo Summer School on Low Carbon Technologies, Italy (June 2019)

**Published
Articles
(Selected)**

A. Singh et al., Biomass Conversion and Biorefinery, 12 (2022) 1-16.
Y. P. Chandra, **A. Singh** et al., Journal Ins. Eng. (India): Series C, 100 (2019), 539-546.
Y. P. Chandra, **A. Singh** et al., Solar Energy, 148 (2017) 36-48.

**Articles in
Review /
Preparation**

A. Singh et al., Characterization and gasification of mixed agro-residue pellets and adsorption-based syngas separation for hydrogen production Under review in Int. J. Hydrog. Energy.
A. Singh et al., Experimental design and uncertainty analysis for multi-specie syngas separation towards bio-hydrogen production [Chemical Engineering Research and Design].
A. Singh et al., Design and development of pilot scale six-step VPSA process for bio-hydrogen production: parametric variation, long duration testing and material regenerability analysis [Separation and Purification Technology].
A. Singh et al., Efficient carbon negative hydrogen production – adsorption equilibrium and multi-component breakthrough dynamics on zeolite 13X [Chemical Engineering Journal].
A. Singh et al., Performance of a commercial scale medical grade oxygen generator: column dynamics, process parameters and long duration testing [Adsorption Science & Technology].
A. Singh et al., Medical grade oxygen generation: adsorption equilibrium, breakthrough dynamics, cyclic regeneration, and practical testing on zeolite LiLSX [Adsorption].

**Open
Source**

A. Singh et al., S³ medical oxygen generator – design document for 3 Nm³/h medical oxygen generation system (released under IISc's response to Covid-19)
- *Technology transfer to several companies*

**Conference
Proceedings
(Selected)**

A. Singh et al., Carbon capture for bio-methanol production: breakthrough characteristics and practical demonstration. 16th GHGT, France, 23-27 October 2022. – Accepted
A. Singh et al., Characterization and thermo-chemical conversion of agro-waste pellets for the generation of green fuels. Green Chemistry – GRC, Spain, 24-29 July 2022.
A. Singh et al., Li-LSX for oxygen production: column breakthrough dynamics and cyclic regeneration. 14th FOA, USA, 22-27 May 2022.
A. Singh et al., Novel vacuum-pressure swing adsorption process for PEMFC compliant bio-hydrogen production. 30th EUBCE, France, 9-12 May 2022.

**Patents
(Granted
and Filed)**

S. Dasappa, A. M. Shivapuji & **A. Singh**, A system for separating hydrogen from a feed gas. Indian patent no. 403719 (Granted).
S. Dasappa, A. M. Shivapuji & **A. Singh**, A system for separating hydrogen from a feed gas. International patent application (no. PCT/IB2022/050976).
S. Dasappa, A. M. Shivapuji & **A. Singh** et al., Novel agro straw bale torrefaction system. Indian patent application (no. 202141002008).
S. Dasappa, A. M. Shivapuji & **A. Singh**, A multi-stage oxygen generation system with self-diagnostic capabilities. Under internal review with application number IPTeL 60545.

**Awards and
Honors**

Carl Storm International Diversity Fellowship Award	2022
International Adsorption Society travel award	2020
CSIR-HRDG foreign travel award	2020
The University of Edinburgh visiting graduate student award	2020
Society for Innovation & Development (SID, IISc) travel award	2019
Graduate Aptitude Test in Engineering (Mechanical)	2014 and 2015
Academic Excellence Award, GZSPTU Campus, Bathinda	2013

**Extra-
curricular
Activities**

Student coordinator – Lab safety, CGPL, IISc Bengaluru	2020-2022
Founding member, Science for Rural India, IISc Bengaluru	2019-2021
Open day and Kidz zone representative, CST, IISc Bengaluru	2019-2020
Department Convener, National Service Scheme, TIET Patiala	2015-2016
Member, ASHRAE Student Chapter, TIET Patiala	2015-2016
Representative, Class of 2014, GZSPTU Campus, Bathinda	2010-2014
Organizer, Annual department festival (Impulse), GZSPTU Campus, Bathinda	2013