

Mr Amrit Chandan BSc (Hons)

Doctoral Researcher

Contact details

Telephone **0121 414 7044** (tel:+44 121 414 7044)

Email a.s.chandan@pgr.bham.ac.uk (<mailto:a.s.chandan@pgr.bham.ac.uk>)

School of Chemical Engineering
University of Birmingham
Edgbaston
Birmingham
B15 2TT
UK



About

Amrit is working with TATA Motors on the development of high performance HT-PEFC electrodes for use in Automotive PEFCs.

Qualifications

1st Class Honors BSc (Hons) in Chemistry

Biography

Amrit graduated from the University of Birmingham at the top of his class with a BSc(Hons) in Chemistry in 2010 before starting work on his PhD in October 2010. Amrit's PhD is funded as a part of the EPSRC Doctoral Training Centre in Hydrogen, Fuel Cells and their applications.

Amrit's research spans the field of fundamental electrocatalysis, to formulation engineering and finally electrode manufacture methods. As such Amrit has experience with a wide variety of experimental techniques ranging from XPS, XRD, TGA, TEM, SEM, EDX to fuel cell fabrication techniques such as hand painting, spraying and screen printing. These catalysts are then tested via electrochemical methods and specific in-situ fuel cell tests. Amrit also has done work using computational multiphysics to help with designing the fuel cell.

During Amrit's PhD he has presented numerous posters at conferences, workshops and events within the UK and internationally. Select Oral presentations include:

- 3rd CARISMA Conference on HT-PEFC development – Copenhagen, Denmark, September 2012
- IChemE Catalysis 2012, UK, December 2012

Amrit also has a keen interest in business development and has taken part in a variety of development courses to further this goal. Amrit, along with his partner Dan, recently won first prize at the University of Birmingham's Plan B Business Competition for their idea on electrolysers.

Amrit is also a member of the Institute of Chemical Engineers, Associate member of the Royal Society of Chemistry and a member of the Energy Institute.

Teaching

Amrit has supervised a total of 10 Masters students (8 MEng and 2 MSc) on a variety of different projects to do with HT-PEFC, all of which reco. Amrit also helps out with the chemical engineering undergraduate 2nd year module "Product Development Exercise".

Research

Supervisors: Professor Robert Steingberger-Wilckens, Dr Neil Rees and Dr Andrew Ingram

The expensive Pt catalyst is prone to poisoning from trace amounts of impurities and as such the lifespan of the fuel cell can be severely impacted by the quality of the fuel used. To tackle this issue, research thus far has involved fine tuning the Pt catalyst by changing the catalyst support system. Two different structures have been used, commercially available carbon black (CB) and inhouse graphene oxide (GO). A good support material will have good electronic conductivity, good catalyst interaction and will be resistant to corrosion. Graphene and GO would appear to offer excellent corrosion and GO has been shown to improve the tolerance of Pt to impurities.

The second area of research is looking to improve the microstructure of the electrode in order to improve the diffusion the catalyst layer. Diffusion is one of the limiting factors with using 2D support systems such as GO. This can be optimised by fine tuning the formulation of the catalyst ink and the method by which the ink is applied.

Other activities

Amrit has developed a keen interest in business since starting the PhD and has since attended various courses to that effect (for example Talent Pool, SPEED WM). Amrit and Dan Symes entered into the Plan B Business Competition where they won first place and a cash prize.

Outside of study, Amrit has a keen interest in doing more science.

Publications

Ahmad El-kharouf, William Hall, Amrit Chandan, Mariska Hattenberger, Bruno G. Pollet & Waldemar Bujalski, PEM Degradation – A review, *Journal of the Energy Institute* - 2013

Amrit Chandan, Mariska Hattenberger, Ahmad El-kharouf, Shangfeng Du, Bruno G. Pollet, Aman Dhir, Andrew Ingram & Waldemar Bujalski, HT-PEM: A Review, *Journal of Power Sources*, **2013** - In Prep

