

Hydrogen Material Challenges

Agenda

17-20 March 2025, Cranfield University campus, Building TBD

Monday 17th March

9:00-9:45	Delegates arrival, coffee and refreshments	
9:45-10:00	Introduction to the course	Francesco Fanicchia (CU)
10:00-10:30	The importance of understanding hydrogen material challenges to decarbonise aviation	Louise Gale (RR)
10:30-11:30	High temperature oxidation and water vapour corrosion	John Nicholls (CU)
11:30-11:45	Break	
11:45-12:45	High temperature oxidation and water vapour corrosion	John Nicholls (CU)
12:45-13:45	Lunch	
13:45-14:45	Materials for Hydrogen Storage and Transport	Krzysztof Koziol (CU)
14:45-15:45	Standards for Hydrogen Storage and Transport	Charlie Hutchings (FN)
15:45-16:00	Break	
16:00-17:00	Hydrogen internal combustion engines	Aaron Costall (CU)

17:15-18:30	Lab visits (Energy Centre + HyPER)	
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Tuesday 18th March

09:00-10:00	Physics of Hydrogen and fundamentals of hydrogen transport	Francesco Fanicchia (CU)
10:00-11:00	Physics of Hydrogen and fundamentals of hydrogen transport	Francesco Fanicchia (CU)
11:00-11:15	Break	
11:15-12:15	Hydrogen permeation barrier coatings	Vikesh Kumar (CU)
12:15-13:15	Fundamentals of hydrogen permeation in composites	Stefanos Giannis (NPL)
13:15-14:15	Lunch	
14:15-15:15	Hydrogen embrittlement	Gustavo Castelluccio (CU)
15:15-16:15	Hydrogen embrittlement	Gustavo Castelluccio (CU)
16:15-17:15	Testing for hydrogen embrittlement	Shengqi Zhou (NPL)

18:30	Event Dinner	
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Wednesday 19th March

09:00-10:00	Hydrogen safety	Edith Rogers (CU)
10:00-11:00	Electrolysis and fuel cells	Indrat Aria (CU)
11:00-11:15	Break	
11:15-12:15	Tritium in Nuclear Fusion	Stuart Christie (UOM)
12:15-13:15	Modelling hydrogen transport in nuclear fusion	James Dark (MIT)
13:15-14:15	Break	
14:15-17:00	Lab activities (Hydrogen permeation)	FF/ VK/ HN/ ER

17:15-18:00	Lab visits (Hydrogen-material testing and Composites Centre)	
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Thursday 20th March

09:00-10:00	Hydrogen production methods	Upul Kahagala Gamage Wijayantha (CU)
10:00-11:00	Hydrogen sensors	Iva Chianella (CU)
11:00-11:15	Break	
11:15-12:15	Material properties and testing at cryogenic temperatures	Huw Edwards (ATI)
12:15-13:15	Entry into Service of H ₂ Aircraft and Wider Decarbonising	Pericles Pilidis (CU)
13:15-14:15	Lunch	
14:15-15:15	Measuring and modelling hydrogen-material interactions I	Emilio Martínez-Pañeda (UO)
15:15-16:15	Measuring and modelling hydrogen-material interactions II	Emilio Martínez-Pañeda (UO)
16:15-16:30	Closing remarks	Francesco Fanicchia (CU)

List of Contributors:

Dr. Francesco Fanicchia (*course conveyor*) – Senior Lecturer in High Temperature Surface Engineering, Cranfield University, UK

Dr. Indrat Aria – Senior Lecturer in Functional Nanomaterials, Cranfield University, UK.

Dr. Gustavo Castelluccio – Reader in Mesoscale Mechanics, Cranfield University, UK

Dr. Iva Chianella – Senior Lecturer in Bio Sensors and Functional Polymers, Cranfield University, UK.

Dr. Stuart Christie – Senior Lecturer, The University of Manchester, UK.

Dr. Aaron Costall – Senior Lecturer in Electric and H₂ Automotive Propulsion Systems, Cranfield University, UK.

Dr. James Dark – Postdoctoral Associate, Plasma Science and Fusion Centre, MIT, USA.

Dr. Huw Edwards – Hydrogen Cryogenic Specialist, Aerospace Technology Institute (ATI), UK.

Dr. Louise Gale – Materials Specialist, Central Technology Team, Rolls Royce Plc., UK.

Prof. Upul Kahagala Gamage Wijayantha, Head, Hydrogen Integration Research Centre, Cranfield University, UK.

Dr. Stefanos Giannis – Science Lead, Advanced Materials, National Physical Laboratories (NPL), UK

Mr. Charlie Hutchings – Materials Performance Engineer, Frazer-Nash Consultancy, UK

Prof. Krzysztof Koziol – Professor of Composites Engineering, Cranfield University, UK.

Dr. Vikesh Kumar – Application Scientist in Materials and Coatings for Extreme Environments, Cranfield University, UK.

Prof. Emilio Martínez-Pañeda – Associate Professor of Engineering Science, University of Oxford, UK.

Mr. Husban Naiyer – Research Assistant, Cranfield University, UK.

Prof. John Nicholls – Professor of Coatings Technology, Cranfield University, UK.

Prof. Pericles Pilidis – Professor of Gas Turbine Performance, Cranfield University, UK.

Dr. Edith Rogers – Research Fellow in Radiation Detector Material Development, Cranfield University, UK.

Dr. Shengqi Zhou – Principal Scientist, National Physical Laboratories (NPL), UK.