Joint European Summer School for Fuel Cell and Hydrogen Technology

22nd August – 2nd September 2011

Viterbo, Italy

Introduction

The 1st joint European summer school for fuel cell and hydrogen technology will take place in Viterbo, Italy, 22.8-02.9.2011.

Following the successful pattern of summer schools carried out under the EU Integrated Projects Real-SOFC and LargeSOFC, the HySafe hydrogen safety courses, and the HyAcademy, University of Ulster, Risø-DTU and Forschungszentrum Jülich have teamed up with the company Heliocentris in the project TrainHy. This is part-funded by the Fuel Cell and Hydrogen Joint Undertaking (FCH JU) which is a joint agency of the European Commission and European industry and research groups in this respective field.
The Summer School will now take a broader approach and address topics from the whole field of low and high temperature fuel cells as well as hydrogen technology. It is targeted at newcomers to the field, experienced students and young professionals. The four courses offered in 2011 cover different subjects and should apply to participants requiring basic introduction to these technologies (the 'Primer'), to those seeking first insights into low or high temperature fuel cells (the introductory courses to LT-FC and HT-FC), and finally those looking for more advanced training on SOFC design and modelling. Within the courses, separate introductory sessions will allow for catching up on basic topics of electrochemistry. Therefore the courses are suitable for students of graduate (Bachelor) and PhD level. It is also helpful for young professionals, technicians and more experienced researchers wishing to review the technologies in question and expand their knowledge, maybe to suit a newly acquired position. The School aims at providing a comprehensive introduction from fundamentals to the choice and design of components up to considerations of market introduction, economics and applications.

The school draws on the knowledge and expertise of a group of teachers currently working at the leading edge of fuel cell and hydrogen research and development in Europe from universities, national research centres and industry.

Topics 2011

- A Primer to Hydrogen and Fuel Cell Technology
- An Introduction to Low Temperature Fuel Cell Technology
- An Introduction to SOFC Technology
- SOFC Design and Modelling

Please refer to the detailed timetables below for information on the respective course contents.

Informal networking is an important element of science and work in general - also of this school, encouraging this becomes possible with the week long format. Students will be given a mini-project to work on in small teams and also be asked to give a short introduction to themselves and the work they are doing (or expect to be doing).

The schedule takes in ca. six hours of formal teaching per day. An optional exam will be available for students who are required to obtain ECTS points relevant to their PhD studies. The school will be validated and academic points awarded by the University of Genoa.

This year the lecturing team will include: A. Atkinson (Imperial College), R Mücke (FZJ), V. Molkov (U. Ulster), B. Pollet (U Birmingham), F. Barbir (Split), J. Mergel (FZJ), S. McPhail (ENEA,), S. Brennan (U. Ulster), W. Lehnert (FZJ), O. Posdziech (EBZ), T. Graule (EMPA), B. de Haart (FZJ), S. Kær (AAU), I. Vinke (FZJ), A. Gubner (FH Munich), S. Linderoth (Risø/DTU), T. Hocker (ZHAW), R. Steinberger-Wilckens (FZJ), T. Kivisari (Wärtsilä), a.o.

Viterbo

Viterbo is an ancient city in the Lazio region of central Italy. It is approximately 80 kilometers north of Rome on the Via Cassia, and it is surrounded by the Monti Cimini and Monti Volsini. The historic centre of the city is surrounded by medieval walls, still intact, built during the 11th and 12th centuries. Entrance to the walled centre of the city is through ancient gates. Apart from agriculture, the main resources of Viterbo's area are pottery, marble, and wood. The town also hosts the Italian gold reserves, an important Academy of Fine Arts, and the University of Tuscia. It is located in a wide thermal area, attracting many tourists from the whole central Italy.

The hotel hosting the school is modern, has an outdoor pool with water slide, a grass football field, and further outdoor activities. Rooms are of a good standard and offer all the facilities you would expect including air-conditioning. More details at www.balletti.it. In early September we can expect temperatures in the mid to high 20°C range. Participants wishing to arrive early or stay longer should make their own arrangements with our contact and cooperating partner: Panhellas Tourism & Congress (Mrs. Manuela Drape Stathoglou, Mail: manuela@panhellas.gr, Tel: 0030 2810 300847, Fax: 0030 2810 30848).

Organization

From 2011 onwards a joint Summer School on Fuel Cell and Hydrogen topics will be organised and partly sponsored as element of the FCH JU TrainHy project. The project partners are the University of Ulster (Belfast), the Danish Technical University – Risø National Laboratory (Roskilde), the company Heliocentris (Berlin), and the research centre Jülich.

Summer School Chairmen

Dr. Robert Steinberger-Wilckens (FZJ, Germany)
Dr. Arief Dahoe (University of Ulster)
Prof. Søren Linderoth (Risø/DTU)

Organizing Team

Dr. Robert Steinberger-Wilckens	(FZ Jülich, Germany)
Mr. Josef Mertens	(FZ Jülich, Germany)
Mrs. Chantal Hake	(FZ Jülich, Germany)

Correspondence

Student registration and financial –
ch.hake@fz-juelich.de, Phone +49 2461 61-2244
Fax +49 2461 61-4155

Lecturers/other information –
jo.mertens@fz-juelich.de, Phone +49 2461 61-6706

Student Fee and Registration

Registration cost per student is 850 €/week; this includes accommodation (6 nights - Sunday to Saturday – double occupancy; single occupancy +125 €, upon availability), all food (full board), tuition, school banquet and the half-day excursion. The registration form for each school category can be found at the end of this document.

All registrations should be made by 15th July 2011 at the very latest.

Getting to Viterbo

As we meet around the end of the main European holiday season, there will very probably be suitable low cost charter flights to Rome airport (www.adr.it) available from a wide range of major and regional European airports.

There will be shuttle transfer coaches for all arrivals and departures from the airport of Rome (Fiumicino Aeroporto) to Balletti Park Hotel and vice versa approx every 3-4 hours. The transfer time by coach is around 1¼ hour, depending on the traffic.
Note: We need to receive your arrival and departure transfer details (flight number / arrival and departure time) in order to arrange the transfers until latest 30.06.2011 !!!

In case you arrive or depart at other dates than in the programme, you will have to arrange your transfer on your own.
Take the train from Fiumicino airport (Trenitalia), reach the station of Roma Trastevere and from there get another train to Viterbo (Porto Romana).
For more information, please have a look at the website www.trenitalia.com
To find the correct connection, add the following information in the space:
From: Fiumicino Aeroporto
To: Viterbo
The journey takes approx 2½ hours and you ALWAYS have to **change train** in **Roma Trastevere.**
From Viterbo, you have to take the bus to Balletti Park Hotel (15-25 minutes)

Private taxi transfers can be arranged and pre-booked – the driving time by taxi is 1¼ hour. Contact our cooperation partner Panhellas Tourism & Congress (Mrs. Manuela Drape Stathoglou, Mail: manuela@panhellas.gr, Tel: 0030 2810 300847, Fax: 0030 2810 30848).

Each taxi can be shared between 3 persons – The rate per taxi per trip is **165,00 €**.

SUMMER SCHOOL PRELIMINARY PROGRAMME

Week 21 – 26 August 2011

Arrive Sunday 21st August – 19:00 hrs: welcome – Steinberger

Monday 22nd August		**Tuesday 23rd August**		**Wednesday 24th August**	
Morning		***Morning***		***Morning***	
Primer for H_2 & FCs	***Introduction to SOFC Technologies***	***Primer for H_2 & FCs***	***Introduction to SOFC Technologies***	***Primer for H_2 & FCs***	***Introduction to SOFC Technologies***
Welcome; Introduction to FCs and H_2; Principles of electrochemistry and thermodynamics of FCs (I) (Steinberger)		Safety II: H_2 fires (Molkov / *Brenan*) H_2 storage, distribution, infrastructure (NN)	Materials for electrolyte, anode & cathode; protective layers (Atkinson)	HT-PEFC (Lehnert) Safety III: H_2 explosions (Molkov / Dahoe)	HTc steels, IC + sealing materials, joining techniques (NN) Ceramic materials producing (Graule)
Lunch / free time		**Lunch / free time**		**Lunch**	
Afternoon		***Afternoon***		***Afternoon***	
Primer for H_2 & FCs	***Introduction to SOFC Technologies***	***Primer for H_2 & FCs***	***Introduction to SOFC Technologies***	***Primer for H_2 & FCs***	***Introduction to SOFC Technologies***
H_2 as an energy carrier: Production and utilisation (NN)	*Newbies / Experienced:* Fundamentals of electro-chemistry, electrochem. kinetics & solid state chemistry (de Haart / Mücke)	*Coursework tutorial* (Dahoe / Molkov / Brennan a.o.) PEFC (Pollet)	*Start students´ project* Steinberger Modelling & stack design (NN)	Half-day excursion	
Safety I: H_2 release and dispersion (Molkov / *Brenan*)					

Thursday 25th August		**Friday 26th August**		**Saturday 27th August**
Morning		***Morning***		
Primer for H_2 & FCs	***Introduction to SOFC Technologies***	***Primer for H_2 & FCs***	***Introduction to SOFC Technologies***	
PAFC, AFC (NN) MCFC, SOFC (McPhail)	SOFC fuels, production & issues & reforming sulfur, carbon, etc. (McPhail) Manufacturing of SOFCs (Mücke)	Fuel cell applications and development challenges (Linderoth) European projects & politics; Information sources & networks (*Steen/FCH JU*)	System concepts & BoP components (*Posdziech*) Degradation issues (de Haart)	***Departure***
Lunch and practical work		**Lunch and practical work**		
Afternoon		***Afternoon***		
Primer for H_2 & FCs	***Introduction to SOFC Technologies***	***Primer for H_2 & FCs***	***Introduction to SOFC Technologies***	
Coursework tutorial (Dahoe / Molkov / Brennan / a.o.)	*Students´ ECTS exam SOFC* (lecturers)	*Coursework tutorial* (Dahoe / Molkov / Brennan / a.o.)	*Students´ project* (Steinberger a.o.)	
Students´ session / participants' contributions		*Exam information/results; thanks and end of the school* (Dahoe / Molkov / Steinberger)		

Actual lecture times vary to suit content, 30 minute coffee breaks at ca. 2 hour intervals.

SUMMER SCHOOL PROGRAMME

Week 29 August – 2 September 2011

Arrive Sunday 28th August – 19:00 hrs: welcome – Steinberger

Monday 29th August		**Tuesday 30th August**		**Wednesday 31st August**	
Morning		***Morning***		***Morning***	
LTFC Summer School	***SOFC Modelling & Design***	***LTFC Summer School***	***SOFC Modelling & Design***	***LTFC Summer School***	***SOFC Modelling & Design***
Welcome; Introduction to FCs: FC types & designs, competing technologies & the market place; Principles of electrochemistry & thermodynamics of FCs (I) (Steinberger)		HT-PEFC: Materials, experiences, challenges (Thomas)	Stack design (Vinke) System concepts & BoP components (Posdziech)	Fuels for LT-FCs (Kær) Stationary applications & demos of LT-FCs (Ellis)	Modelling basics II (Hocker) 1D, 2D simulations (Gubner)
Lunch and practical work		**Lunch and practical work**		**Lunch**	
Afternoon		***Afternoon***		***Afternoon***	
LTFC Summer School	***SOFC Modelling & Design***	***LTFC Summer School***	***SOFC Modelling & Design***	***LTFC Summer School***	***SOFC Modelling & Design***
Thermo-dynamics & electro-chemistry of LT-FCs (Barbir) PEFC & DMFC: materals, experiences, challenges (Mergel)	*Newbies / Experienced:* Fundamentals of electro-chemistry, electrochem. kinetics & solid state chemistry (de Haart / Mücke) Cell design (NN)	*Start students´ project* (Linderoth / lecturers) AFC, PAFC: materials, experiences, challenges (NN)	*Start students´ project* Steinberger Modelling basics I (Hocker)	Half-day excursion	
Poster session					

Thursday 1st September		Friday 2nd September		Saturday 3rd Sept.
Morning		***Morning***		
LTFC Summer School	***SOFC Modelling & Design***	***LTFC Summer School***	***SOFC Modelling & Design***	
Mobile applications & demos of LT-FCs; practical work (NN)	CFD simulations (Gubner) Degradation modelling (*Kulikowsky*)	How to progress on LT-FCs ?; practical work (Barbir)	BoP modelling (*Kivisaari*) Hybrid systems (*Friedrich*)	***Departure***
Lunch / free time		**Lunch**		
Afternoon		***Afternoon***		
LTFC Summer School	***SOFC Modelling & Design***	***LTFC Summer School***	***SOFC Modelling & Design***	
Students´ ECTS exam LT-FC (lecturers)	*Students´ ECTS exam SOFC* (lecturers)	*Students´ projects* (Linderoth / Steinberger)		
Students´ session / participants' contributions		*Exam information/results; thanks and end of the school* (Linderoth / Steinberger)		
Poster session				

Actual lecture times vary to suit content, 30 minute coffee breaks at ca. 2 hour intervals.

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A primer for H_2 and FCs ☐ ***Introduction to SOFC Technologies*** ☐

Balletti Park Hotel
22nd - 26th August 2011, Viterbo, Italy

Deadline for registration: **15th July 2011**

Title :	
Family Name :	
First name :	
University/Institution/Company Name	
Street / P.O. Box :	
Postal Code :	
Town/City :	
Country :	
Phone :	
Fax :	
E-mail :	
Rome arrival date and time:	
Rome departure date and time:	
Room category:	Double room (850,00 €) ☐ Single room (975,00 €) ☐
Please note any special dietary requirements, disabilities etc. that we may need to know about	

The participation fee will be paid by

☐ ***bank transfer to***
Sparkasse Düren
Account No. 337 709
National bank code: 395 501 10
IBAN: DE14 3955 0110 0000 3377 09
BIC/Swift: SDUEDE33XXX
Reference: School title and participant´s name

☐ ***credit card***
Fill in the attached form and fax it to **+49 2461 614155**

Note: We need to receive your arrival and departure transfer details (flight number / arrival and departure time) in order to arrange the transfers until latest 30.06.2011 !!!

Joint European Summer School for Fuel Cell and Hydrogen Technology

LTFC Summer School ☐ ***SOFC Modelling and Design*** ☐

Balletti Park Hotel
29nd August – 2nd September 2011, Viterbo, Italy

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