Programme Review Day
Brussels, 28 & 29 November 2012

TrainHy

Contract number 256703

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Building Training Programmes for Young Professionals in the Hydrogen and Fuel Cell Field

- duration 01.10.2010 – 30.09.2012
- budget 345.932 €, FCH JU funding 269 105 € (78%)
- the project addresses lack of specific training in fuel cell and hydrogen technologies for post graduates and young professionals

The consortium consists of 5 partners:

University of Birmingham (coordinator)
Forschungszentrum Jülich
Risø-DTU
U Ulster
Heliocentris

Project approach

(1) review of existing training programmes and courses in Europe in FCH

(2) build concept for flexible and modular training scheme

(3) build curriculum and module descriptions

(4) create experimental material to be used outside laboratory settings

(5) perform 2 Summer Schools testing the concepts

Output:

- specifications for FCH post-graduate level training
- curriculum of teaching content
- validated schemes for practical implementation of courses

Project outcome

Curriculum Development

curriculum for annual training course(s) on FCH with

- summer schools elements
- distance learning (“e-learning”)
- regular courses
- administrative / financial aspects

Output:

-International curriculum on FCH

-Organisational and financing information

Project outcome (2)

Teaching Material Development

- Development of written material for lectures:

(1) set of presentations for lecturers

(2) handouts with background information

- Development of set-ups for experimental work, independent of laboratory environment

Implementation

According to the curriculum establishment of elements of the course programme (summer school, e-learning modules)

Course organisation (location, course material preparation, etc.)

1st Joint European Summer School for FC and H_2 Technology

22.8 – 02.9.2011, Viterbo, Italy

4 separate courses

- A Primer on hydrogen and Fuel Cell Technology - 21-27.8
- An Introduction to Solid Oxide Fuel Cell Technology - 21-27.8
- An Introduction to Low Temperature Fuel Cell Technology - 29.8-02.9
- Solid Oxide Fuel Cell Design and Modelling - 28.8-02.9

58 participants from Western / Eastern Europe and rest of the world (Japan, USA, India)

Summer School 2011 (2)

1st Joint European Summer School for FC and H_2 Technology

22.8 – 02.9.2011, Viterbo, Italy (2)

- 6 hours of formal teaching per day
- 2 hours of practical work (2days per week) [optional]
- (optional) exam validated

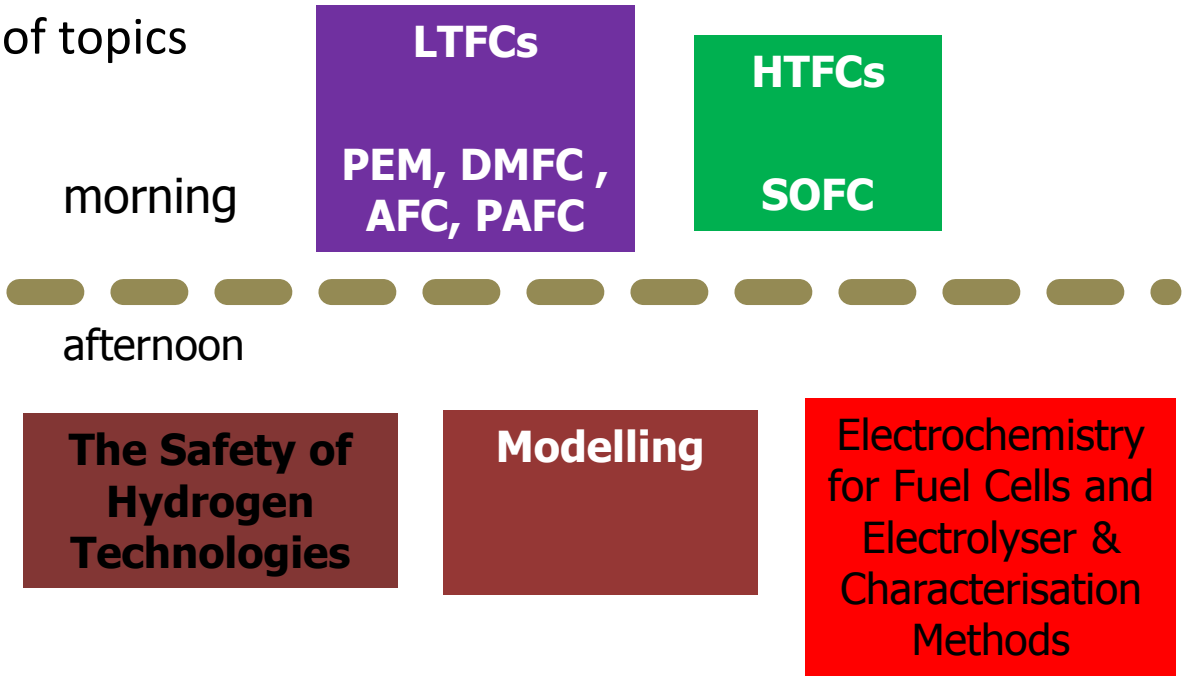
  7.5 ECTS points for *Primer on H&FC Technology,* in connection with semester work at U Ulster

  2.5 ECTS points for other courses awarded by U Genoa
- Students´ projects to work on in small teams and presented at the end of the school week

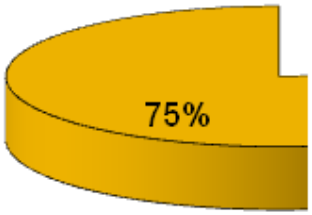
2nd Joint European Summer School

Sept. 2012 in Iraklion, Crete

- more modular and flexible approach
- integration of a variety of topics



Statistics



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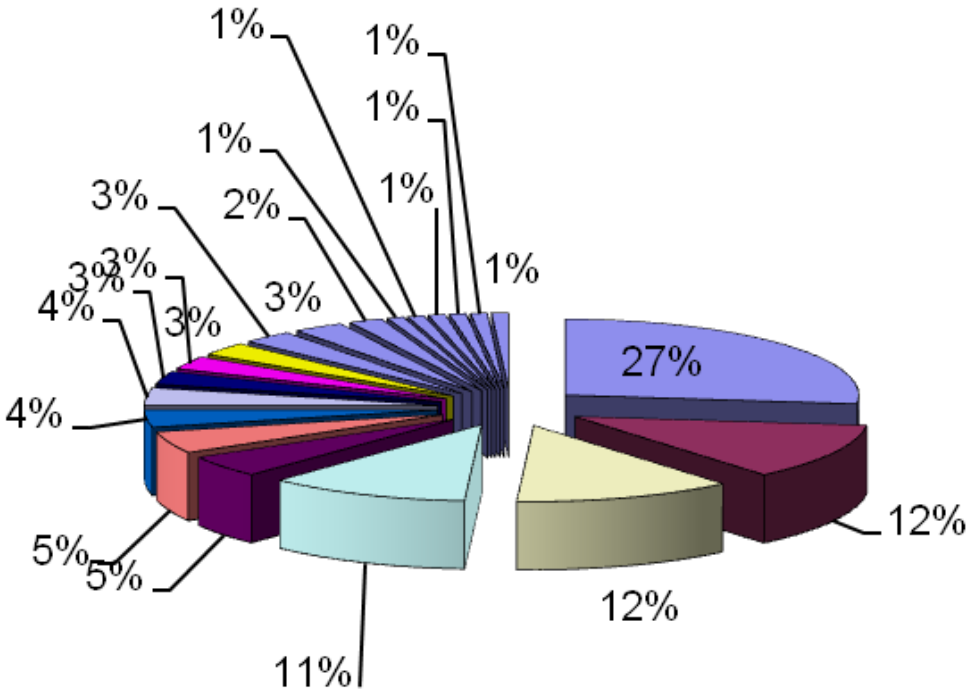

total participants: 114

- Denmark
- Germany
- UK
- Finland
- Italy
- Switzerland
- Netherlands
- USA
- Czekia
- Russia
- Belgium
- Poland
- Spain
- Tunesia
- Ireland
- Sweden
- Slovenia
- India
- Japan
- Israel

Balance between a Stringent Teaching Programme and Recreation & Networking

1. Fundamental modules

1.1 Thermodynamics and Electrochemistry

1.1.1 Thermodynamics

1.1.1.1 Basic concepts:

Equilibrium and non-equilibrium; thermodynamic quantities; reversible and irreversible processes

1.1.1.2 Gibbs free energy and the chemical potential: Definition and

2.6 Solid Oxide Fuel Cell (SOFC)

2.6.1 Cell components

2.6.1.1 Anode:

Requirements for anodes: Electrode reaction; Ionic and electronic conductivity and thermo-mechanical requirements; TPB electrodes; MIEC electrodes

Ni-based anodes: Composites; Electrochemical performance; Fuel reforming and S-tolerance; Redox cycling

Research directions: 3-D microstructures and modelling; Oxide anodes (LSCrM, SYT); infiltrated electrodes.

Teaching Material Development

- 'Table-top' experimental setups
- student hand-outs
- teacher preparation material

Alignment with MAIP

- “In order to create the human resource base required by a growing industry, educational activities should be undertaken developing training programmes at all levels, in particular for specific target groups such as regulators and technical project managers.” is the only specific statement in the MAIP referring to education (other three mentions are rather general)
- considering the success and impact of the Summer School and the distance learning activities run by the project partners in the past and in parallel to TrainHy, more emphasis should be laid on educational issues, especially on continuing the now begun actions
- coordination is taking place with the SET-Plan and the EERA initiative

Evaluation, Dissemination & Liaison

- publication of course details and project details
- evaluation of the training measures, i.e
  - educational potential for participants
  - participants´expectations (general + prior to courses)
  - acceptance of course concept in education community
  - implementation of organisational and tuitional experiences
- liaison with advisory groups and other projects

Technology Transfer / Collaborations

- Contact initiated with the projects

  HyFacts (256823) [Target group = Regulators and public safety officials]

  HYPROFESSIONALS (256758) [Target group = Technical professionals]
- Cooperation sought with LEONARDO for synergies and funding opportunities
- Advisory Committee from industry, academia and research institutions for discussing project alignment and implementation

Future perspectives

- future use of the curriculum and teaching materials not clear within FCH JU structure
- need to integrate further educational activities in FCH JU 2.0, HORIZON 2020 and EERA
- continuation of work to further develop and detail the curriculum outline outside FCH JU due to lack of funding, using industry sponsorships
- further activities to integrate curriculum with European educational system

Useful References

- **Project home page**
  http://www.hysafe.org/TrainHyProf

- **General information on and programme of the summer school**
  http://www.hysafe.org/SummerSchoolFCH

Thank You for your Attention !