

3rd SFERA-III* / 16th SOLLAB Doctoral Colloquium & Summer School 2022

September 12th – 16th 2022
ETH Zurich, Zurich, Switzerland



Program

Venue: HG F3 (see map last page)

* This project has received funding from the European Union's Horizon2020 Research and Innovation programme under grant agreement n°823802

Doctoral Colloquium

September 12th – 14th 2022

Monday, September 12th

08:30 – 09:00 **Registration** (collecting of name tag, signing in)

inside HG F3

09:00 – 09:10 **Opening and Welcome**

by Daniel Notter and Prof. Aldo Steinfeld, ETH Zurich (Organizers)

Session 1: Solar Systems

Chair: Prof. Manuel Romero, IMDEA

09:10 – 09:30 **Estimating predictive uncertainties of machine learning applications on solar tower power plants**

Leon Sievers, DLR

09:30 – 09:50 **Coupled Optimization of Design and Operation for Complex Hybrid Solar Power Systems**

Matthias Loevenich, DLR

09:50 – 10:10 **Techno-economic comparison of integrated CSP/PV concepts for pure electricity generation and combined heat and electricity generation**

Moritz Ruhwedel, DLR

10:10 – 10:30 **Analysis of solar power plant data for optimization of annual yield tools**

Tim Kotzab, DLR

10:30 – 11:00 **Coffee break**

11:00 – 11:20 **Potential applications of CSP technology in high-temperature industrial processes in Chile**

Juan Sebastián Zuleta Marin, Fraunhofer ISE

11:20 – 11:40 **Application of AI methods to improve Operation and maintenance of CSP power plants**

Thomas Kraft, Fraunhofer ISE

Session 2: Solar Optics

Chairs: Dr. Alain Dollet, PROMES-CNRS / Dr. Ricardo Sanchez, CIEMAT

11:40 – 12:00 **Evaluation of equipment for outdoor reflector measurements in CSP solar fields**

Johannes Wette, CIEMAT-PSA

12:00 – 12:20 **Characterizations and tests on the new Fresnel solar furnace testing platform at the Plataforma Solar de Almeria**
Noelia Estremera-Pedriza, CIEMAT-PSA

12:20 – 14:00 **Lunch** (*individually*)

14:00 – 14:20 **Approach for modelling the thermal performance of a Linear Fresnel Collector with a Trapezoidal Cavity Multi-tube Receiver**
Sergio Alcalde-Morales, CIEMAT-PSA

14:20 – 14:40 **Deep learning inversion of a raytracer**
Jan Lewen, DLR

14:40 – 15:00 **A purely data-driven deep learning digital twin approach for a heliostat field for flux density predictions**
Mathias Kuhl, DLR

15:00 – 15:20 **Geometric optimization of linear Fresnel collectors for solar thermal electricity**
André Santos, UEVORA

15:20 – 15:50 **Coffee break**

15:50 – 17:10 **Visit to Solar Mini-Refinery**

18:30 – 22:00 **Social Activity (Part 1)**
Dinner in Dozentenfoyer

Tuesday, September 13th

Session 4: Solar Fuels and Materials

Chairs: Prof. Christian Sattler, DLR / Dr. Martin Roeb, DLR

09:00 – 09:20 Photocatalytic hydrogen production by natural solar radiation at pilot scale

Joyce Gloria Villachica Llamosas, CIEMAT-PSA

09:20 – 09:40 Sweeoped, Open, Moving Particle Reactor with Intrinsic Heat Recovery for Solar Thermochemical Hydrogen Production

Anika Weber, DLR

09:40 – 10:00 Reactor and system modelling for solar production of ethylene from H₂O and CO₂

David Brust, DLR

10:00 – 10:20 Get the right feature: Tailoring of material properties by Sr content in Ca_{1-x}Sr_xMnO_{3-δ}

Lena Klaas, DLR

10:20 – 11:00 Coffee break

11:00 – 11:20 Computational screening and experimental validation of binary and ternary metal nitrides for the solar-driven thermochemical production of green ammonia

Daniel Notter, ETH

11:20 – 11:40 Dry Redox Reforming

Mario Zuber, ETH

11:40 – 12:00 Fully-automated Solar Fuel System for the Thermochemical Production of Syngas from H₂O and CO₂ applicable for Methanol or Fischer-Tropsch Synthesis

Remo Schächli, ETH

12:00 – 12:20 Solar calcination of non-metallic minerals: metakaoline production to synthesize zeolites

Pelin Paşabeyoğlu, METU

12:20 – 14:00 Lunch (individually)

14:00 – 14:20 Experimental Assessment of Solar Methane Pyrolysis in a Molten-Tin Bubble Column Reactor

Malek Msheik, PROMES-CNRS

14:20 – 14:40 Modelling and Performance Analysis of a SOE System integrating PV, Concentrating Solar Heat and Thermal Energy Storage

Beatriz Herrero Badorrey, IMDEA

Session 5: **Solar Water Treatment**

Chair: Prof. Sixto Malato, CIEMAT-PSA

14:40 – 15:00 **Natural based solutions combined with solar advanced oxidation processes for wastewater recovery**

Alba Hernández-Zanoletty, CIEMAT-PSA

15:00 – 15:20 **Performance comparison of commercial membrane distillation modules operating in vacuum-assisted air gap configuration for brine concentration**

Isabel M^a Requena Requena, CIEMAT-PSA

15:20 – 15:50 *Coffee break*

15:50 – 16:10 **Modelling and automation of a multi-effect distillation plant for the optimal coupling with solar energy**

Juan Miguel Serrano Rodríguez, CIEMAT-PSA

16:10 – 16:30 **Implementation and evaluation of a solar photo-Fenton treatment plant for wastewater reclamation**

Elizabeth Gualda-Alonso, UAL

16:30 – 16:50 **New tertiary treatment for wastewater reclamation: Solar photo-Fenton combined with NaOCl**

Solaima Belachqer-El Attar, UAL

16:50 – 17:00 *Closing remarks*

Wednesday, September 14th**Session 6: Solar Receivers (Part B)****Chairs:** Prof. Robert Pitz-Paal, DLR / Prof. Bernhard Hoffschmidt, DLR**09:00 – 09:20 High temperature pressure sealing: Utilization in a receiver-reactor cavity system**

Estefanía Vega Puga, DLR

09:20 – 09:40 Numerical investigation of a helically coiled solar cavity receiver for simultaneous generation of superheated steam and air

Yasuki Kadohiro, DLR

09:40 – 10:00 Optimization of Porous Structures for Enhanced Radiation Heat Transfer Using a Voxel-Based Ray-Tracing Algorithm

Sebastian Sas Brunser, ETH

10:00 – 10:20 Development of an experimental testbed for Pressurised Gas Solar Receivers using a High Flux Solar Simulator

David D'Souza, IMDEA

10:20 – 11:00 *Coffee break***11:00 – 11:20 Numerical Simulation of Pressure Drop in Wire Mesh Absorbers with Fixed Porosity**

Daniel Sanchez, CIEMAT-PSA

11:20 – 11:40 Optimization of Spinel Absorber Coatings for CSP Particle Receivers

Meryem Farchado, CIEMAT-PSA

11:40 – 12:00 Numerical simulation of Improved Design for an Integrated Receiver and Storage system for CSP applications

Christos Tengeris, CYI

12:00 – 12:10 *Closing remarks***12:10 – 14:00 *Lunch (individually)*****14:00 – 18:00 Social Activity (Part 2)**

Hike on Uetliberg

Summer School

Topic: **Solar Thermochemistry**

September 15th – 16th 2022

Thursday, September 15th

08:30 – 09:00 *Registration* (collecting of name tag, signing in)

inside HG F3

09:00 – 09:05 *Opening and Welcome*

by Brendan Bulfin, ETH Zurich (Organizer)

Summer School: **Day 1**

Chair: Brendan Bulfin

09:05 – 10:00 **Status and perspective of solar thermochemical fuels, chemicals, and basic materials production.**

Martin Roeb, German Aerospace Center

10:00 – 10:30 *Coffee break*

10:30 – 11:30 **Solar fuel processing by concentrated light and photoelectrochemistry**

Sophia Haussener, Ecole Polytechnique Fédérale de Lausanne

11:30 – 12:30 **Solar reforming of methane.**

Jonathan Scheffe, University of Florida

12:30 – 14:00 *Lunch (individually)*

14:00 – 15:00 **Decarbonizing aviation with solar jet fuel.**

Simon Ackermann, Synhelion AG

15:00 – 17:00 **Panel discussion: Industrial Deployment of Solar Heat for Chemical Processes**

(with coffee break)

Moderator: Brendan Bulfin

Panelists: Andreas Häberle*, Martin Roeb, Sophia Haussener, Jonathan Scheffe, & Simon Ackermann

* Eastern Switzerland University of Applied Sciences (OST)

Friday, September 16th

Summer School: Day 2

Chair: Jonathan Scheffe

09:00 – 10:00 Development of redox oxides for thermochemical heat storage in concentrated solar power plants.

Alfonso J. Carrillo, Universitat Politècnica de València

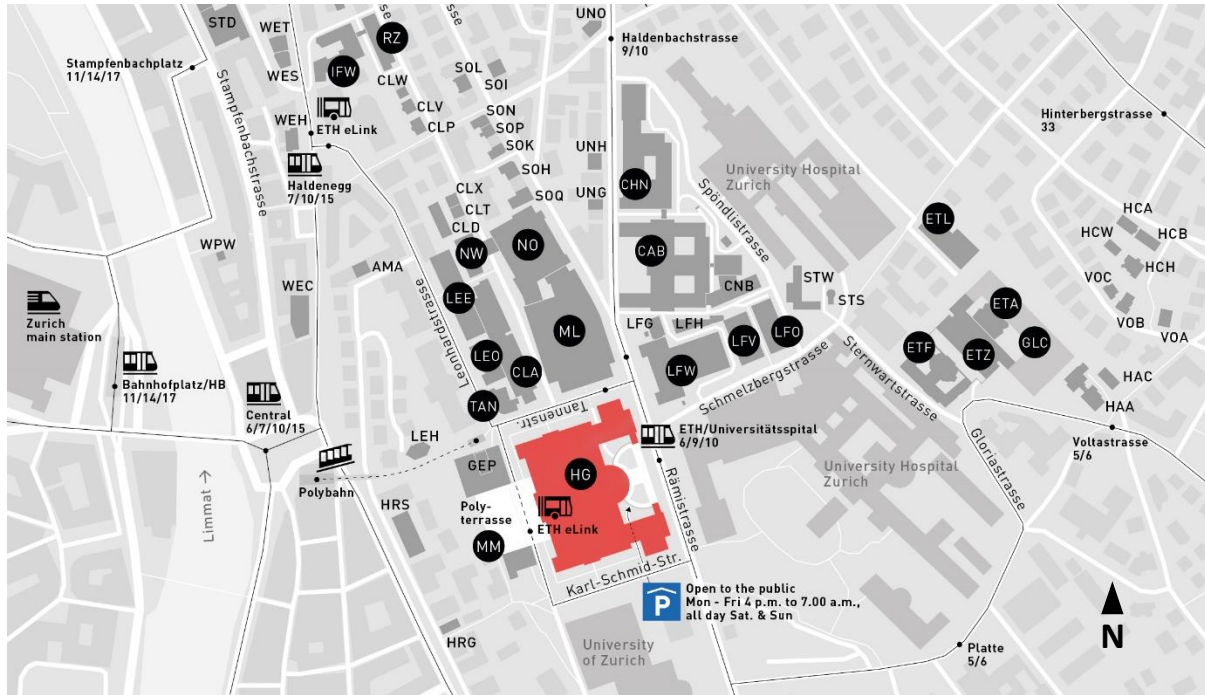
10:00 – 10:30 *Coffee break*

10:30 – 11:30 Non-stoichiometric redox materials and their applications in thermochemical processes.

Brendan Bulfin, ETH Zurich

Venue: HG F3

Building: HG



Room: HG F3 (Floor F)

