SFERA-III
Solar Facilities for the European Research Area

Webinar session
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Trans-national Access to SFERA-III Research Infrastructures

Ricardo Sanchez, CIEMAT-PSA

ACCESS TO FACILITIES

THIS PROJECT HAS RECEIVED FUNDING FROM THE EUROPEAN UNION'S HORIZON 2020 RESEARCH AND INNOVATION PROGRAMME UNDER GRANT AGREEMENT NO **823802**

Content:

- Objectives of the SFERA-III Projects
- Objectives of the Trans-national Access Programme
- Modality of access
- Requirements for access
- Support offered to Users
- Templates to fill in
- Evaluation of Proposal Form
- Installations and Services offered
- Success stories

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SFERA-III
Solar Facilities for the European Research Area

Objectives of the SFERA-III Project:

Addressing advanced science challenges and integrated research activities

Offering to the R&D community a new level of high-quality services

Opening key Research Infrastructures (RIs) in solar concentrating systems

Carrying out energy and materials research as well as research in other fields

Training of a new generation of researchers and engineers

What does this translate into?

- **Educating new researchers** to enable them to make appropriate use of the RIs

- **Fostering the use of RIs by industrial researchers** and **increasing the general awareness in the possible applications of the CST technologies**

- **Increasing the scientific and technological knowledge in the CST field**, and **fostering the innovation potential of the RIs**

What does this translate into?

- **Providing access to state-of-the-art CST research infrastructures**:
  - 11 European advanced solar laboratories, and
  - 2 research infrastructures located in two neighbouring countries, i.e. Turkey and Switzerland, which complement the services offered by the European RIs
- **Providing new and more advanced services to the CST industry and academics** in all the areas of interest

- thermal storage systems
- water desalination
- water treatment
- solar fuel production
- materials for solar receivers and STE components
- linear systems and point focusing systems

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Objectives of the Trans-national Access Programme

- **Offering** European and non-European researchers from academy and industry **effective and well-organised access** to unique and diverse European advanced solar laboratories and advanced solar laboratories in two neighbouring countries
- **Providing high quality infrastructures and services** that enable users to conduct first-class experimental research focusing on CST activities
- **Supporting promising researchers** who do not have access to high quality RIs in their own country

Note: Facilities are also **open for any other suitable R&D project from any other sector** needing the use of CST technologies for their success.

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Modality of access

- Access is regulated by a **competitive concurrence regime procedure**, the so-called **quality-based Access mode**, with an independent and transparent evaluation process
- The **Call for Proposals** will be open on a yearly basis for all the services
- The time periods in which each installation will be offering Trans-national Access to Users will be established in a **calendar**
- A **Single Entry Point (SEP)** on the SFERA-III Project website allows accessing the overall list of facilities, technologies, as well as services available, and submitting a comprehensive proposal

Modality of access

- **Rules** and the **application procedure** are described on the SEP where the **application form** is also available
- Access will always be **granted to a single SFERA-III site** for all project steps
- The **duration of the Access stay** will be defined by the work plan described in the proposal and agreed with the Installation Project Leader* (IPL). This duration will **never exceed 3 months**, **nor be less than 3 days (1/2 week)**

*Person responsible for a project at the Research Infrastructure.

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Requirements for access

- Multiple access to the same facility under the same proposal cannot be supported beyond standard reimbursement limits
- **A maximum of two Users** (exceptionally three Users) **per proposal can be supported**
- The user group leader and the majority of the users must **work in a country other than the country(ies) where the installation is located**
- Access for user groups with a majority of **users not working in a EU or associated country** is now possible under H2020 on the condition that it is **limited to 20%** of the total amount of units of access provided under the grant

Requirements for access

- Only users or user groups that are **allowed to disseminate the results** they have generated under the action may benefit from the access
- **Users working for or with industry** of any size **are very welcome** to apply for SFERA-III access either alone or in partnership with academic teams. Access is granted free-of-charge provided results are published
- **Users working for SMEs are exempted from the obligation to disseminate the results generated within SFERA-III**. Proposals submitted by users working for SMEs will undergo technical feasibility check and scientific evaluation as for all SFERA-III proposals.

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Support offered to Users (prior to Access)

- Users can contact the Access Provider to discuss
  - the **project idea** before submitting the Application (contact details on the SEP), and
  - the **technical and logistic details** related to the requested Access
    - technical requirements of the Research,
    - materials needed,
    - estimated Access duration, and
    - installation to be used for the Access
- User will be informed about options for **travel and accommodation**
- Access Provider can arrange for the **shipment of the samples** necessary for the execution of the Project (agreed on a case-by-case basis)

Support offered to Users (during the Access)

During the Access, the Access Provider will

- provide information on:
  - Health and Safety Rules implemented in the installation
  - Internal rules concerning transport, meals, working time, etc.
- support the User on any **research and scientific aspects** regarding the experiments to be performed
- provide the User with the **on-site technical assistance** that s/he may require to perform the experiments
- **assist the User with analysis of data** by trained and experienced research staff

Support offered to Users (after the Access)

Once the Access is finished, Users must prepare two reports:

- An **Access Summary Report**
- An **Access Evaluation Report**

Access provider will

- support the User in the drafting of the **Access Summary Report**
- provide the User with any information s/he could need **for the processing and evaluation of the tests data collected** during the Access

- Access Provider can arrange for the **shipment of the samples** gathered or generated during the Access (agreed on a case-by-case basis)

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Templates to fill in:

The SFERA-III User Research Proposal Form is divided into two parts:

- The electronic form which includes:
  - Title of the proposed project
  - Acronym
  - Scientific Field
  - Installation to which Access is requested
  - Information on the applicant (User Group Leader)
  - Brief CV of the group leader, including a short list of the most relevant papers
  - Short description identifying the team members and their current lines of research, specifying why the team activities are relevant to the project implementation.
  - Commitments of the applicant

Templates to fill in:

The SFERA-III User Research Proposal Form is divided into two parts:

- The **SFERA-III Application Form (SAF)** which includes:
  - Objectives of the project (valid for the criterion of scientific excellence)
  - Full details of any necessary materials including samples
  - Your previous work in the field
  - Detailed work plan (what you intend to do in the installation, any potential risk(s) related to the Access, how many visits, how many people)
  - Why you need to make use of the selected installation (valid for the criterion of technical feasibility)
  - Expected results and possible application, as well as information or experience you will be able to gain from this Access stay

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Evaluation of the SFERA-III User Research Proposal Form

All access proposals will go through three stages of review:

1. **Eligibility Assessment** by the Access Coordinator
2. **Technical feasibility assessment** by the Access Provider
3. **Scientific evaluation** by the User Selection Panel

During the evaluation process, Applicants may be requested to provide additional information if considered necessary by the Access Provider or any member of the User Selection Panel

Evaluation of the SFERA-III User Research Proposal Form

1. **Eligibility Assessment**

   A pre-screening of the incoming proposals conducted by the Access coordinator to check the compliance of the proposals with the eligibility criteria as set down by the EC Trans-national Access rules.

2. **Technical feasibility assessment** based on the following aspects:
   - **Feasibility of the project** to be successfully conducted with the SFERA-III service providing installation;
   - **Availability of required technologies and expertise** at the SFERA-III service provider; and
   - **Availability of possible required supporting laboratory** for the project execution

Evaluation of the SFERA-III User Research Proposal Form

3. **Scientific evaluation** based on the following criteria:
    - **Scientific excellence** of the project (5 points)
    - **Overall technical quality** of the project (5 points), and
    - **Qualifications and complementarity** of the User Group (5 points)

- The threshold for individual criteria is 3, while the overall threshold, applying to the sum of the three individual scores, is 9
- If the proposal fails to achieve a threshold for any of the criteria, the evaluation of the proposal will be stopped

Evaluation of the SFERA-III User Research Proposal Form

Access priority will be given to User Groups composed of users who:

- have not previously used the installation,
- are working in countries where no equivalent research infrastructure exist,
- are young researchers, taking into account the parity of male-female users, and
- are from outside the SFERA-III network.

Those proposals contributing to the **improvement of the services** provided by the infrastructures, the **harmonisation and optimization of methodologies**, and the **reinforcement of the partnership with industry** will receive a special consideration

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Installation and Services offered

Access provider short name	Short name of infrastructure	Installation country code	Min. quantity of access to be provided (weeks)
1 – CIEMAT	PSA	ES	**86**
2 – CNRS	PROMES	FR	**83**
3 – ENEA	ENEA	IT	**17**
4 – DLR	Solar Institute	DE	**20**
5 – CEA	DURASOL	FR	**58**
5 – CEA	ESTHER	FR	**10**
6 – UEVORA	RES	PT	**32**
7 – ETHZ	PREC	CH	**24**
8 – IMDEA	IMDEA	ES	**26**
9 – CYI	CYI Campus	CY	**10**
9 – CYI	PROTEAS	CY	**22**
10 – Fraunhofer	ISE-Lab	DE	**38**
11 – LNEG	LNEG	PT	**10**
12 – METU	ODAK	TR	**5**
13 – UAL	CIESOL	ES	**11**

SFERA-III is providing access to 15 state-of-the-art CST RIs, unique in the world, and a total of **47 installations**.

Quantity of access to be provided

452 weeks

Access for non-EU users

Up to 90 weeks

Installation and Services offered

Allowing **academic and industrial Users** to conduct excellent research but also qualify commercial prototypes **in fields such as** but not limited to:

- Solar thermal electricity generation (tests from research on components and methods to full prototypes systems):
  - ✓ thermodynamic cycles such as Brayton and Stirling cycles,
  - ✓ receivers and their coatings,
  - ✓ thermal storage,
  - ✓ concentrating optics and mirrors,
  - ✓ control algorithms and solar resource evaluation,
  - ✓ heliostats and linear collectors,
  - ✓ high concentration PV cells, etc.

Installation and Services offered

Allowing **academic and industrial Users** to conduct excellent research but also qualify commercial prototypes **in fields such as** but not limited to:

- Solar fuels production: H_2, Syngas, liquid and gas hydrocabons, etc.
- Cycles for chemical storage of solar energy for short and long duration: ZnO, CeO, Iron, etc.
- Solar water treatment: desalination, disinfection and decontamination
- Solar heating and cooling of buildings to improve the energy efficiency in buildings
- Modelling and controlling of concentrating solar technologies for power plants and for industrial processes

Installation and Services offered

Allowing **academic and industrial Users** to conduct excellent research but also qualify commercial prototypes **in fields such as** but not limited to:

- High value material synthesis and/or coatings deposits (experimental or test of processes): nanomaterials like C or ZnO nanotubes, new ceramics or metals, foams, catalytic layers, etc.
- High-flux photochemistry and photo-physics.
- Characterization of materials behaviour and properties under extreme conditions such as for solar, space or nuclear fields: thermal shields, high temperature materials and parts, etc.
- Solar pumping of LASER for industrial and space applications.

Installation and Services offered

1. SOLAR RESOURCE (DNI) AND METEOROLOGICAL PARAMETERS ASSESSMENT
2. SERVICES ON REFLECTORS AND CONCENTRATORS
   - 2.1. Experimental Services on Reflectors
   - 2.2. Available Services on Concentrator's Experimental Characterization
3. EXPERIMENTAL SERVICES ON ABSORBERS AND RECEIVERS
   - 3.1. Experimental Services on Absorbers
   - 3.2. Experimental Services on Linear Focus Receivers
   - 3.3. Experimental Services on Anti-Reflective Materials
   - 3.4. Experimental Services on Point Focus Receivers
4. SERVICES ON HEAT TRANSFER FLUIDS
5. SERVICES ON AUXILIARY EQUIPMENT
6. SERVICES ON THERMAL ENERGY STORAGE (MEDIA & SYSTEMS)
7. SERVICES ON ENGINES AND POWER BLOCS
   - 7.1. Solarized Stirling Engines
   - 7.2. Other Services on Engines and Power Blocks for CSP
8. SERVICES ON CALIBRATION OF KEY SENSORS & MEASUREMENTS FOR STE
9. SERVICES ON SOLAR CHEMISTRY
   - 9.1. Water Treatment, Disinfection and Desalination
   - 9.2. High Temperature Solar Chemistry
   - 9.3. Solar Hydrogen
10. SERVICES ON MATERIALS TESTING AND QUALIFICATION
11. SERVICES USING EXTREME TEMPERATURE CONDITIONS IN SOLAR CONCENTRATORS

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Success stories

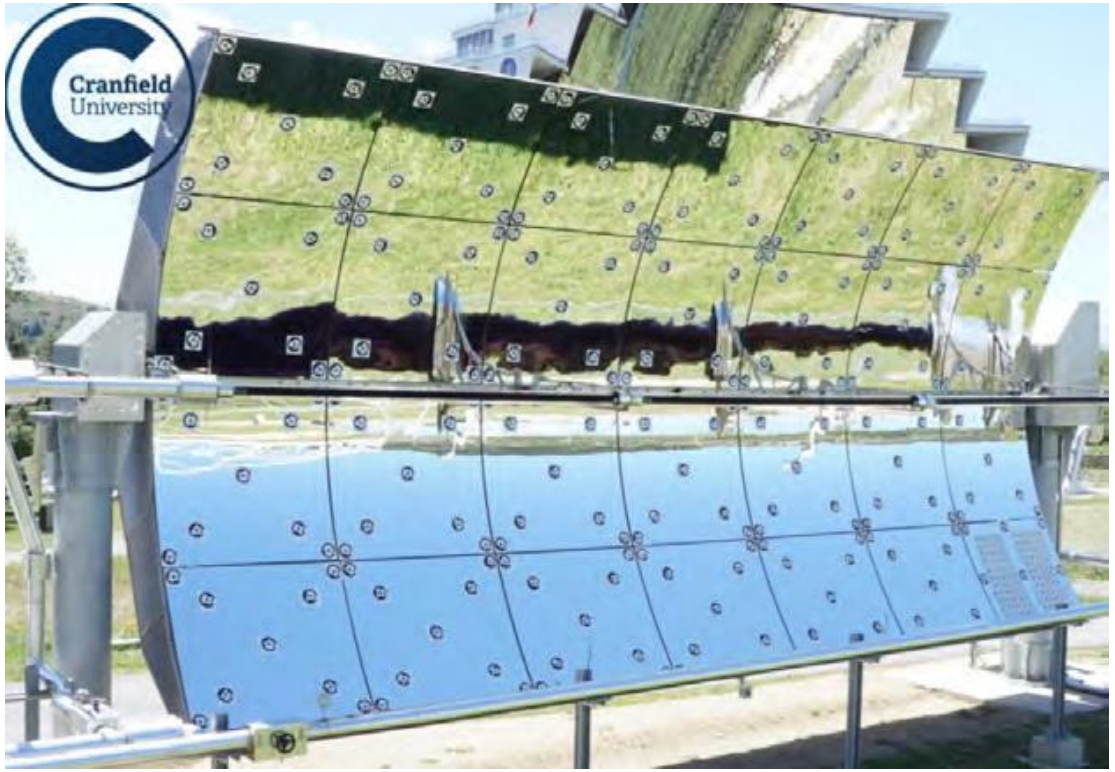
Project: **Repeatability of the Photogrammetric Assessment of Parabolic Trough Collectors (RePAC)**

Installation: Linear concentrating system, MiniTrough - CNRS-PROMES

User Group Home Institution: Cranfield University, United Kingdom

Objective: This project aims to evaluate a photogrammetry technique previously developed at Cranfield University, by using measurements of a full size parabolic trough taken under real outdoor working conditions.

Success stories



Experiment: Photogrammetry targets were attached to a single parabolic trough module, and photographs were taken by multiple operators and cameras from a range of locations. The trough was moved to different tracking positions and measurements were made at each position.

Success stories

Achievements: Small differences in repeatability (0.048mm vs 0.072mm) were seen between the measurements obtained for each operator and for each camera, highlighting the importance of these factors. The measurements at different tracking positions showed how the trough structure moves under gravity during the day, and the effect on the mirror shape.

Success stories

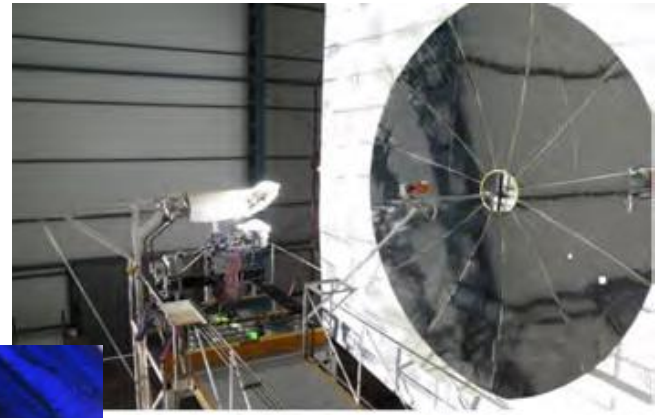
Project: **Anti-wear carbide-based coatings using concentrated solar energy (CarbiSol-3)**.

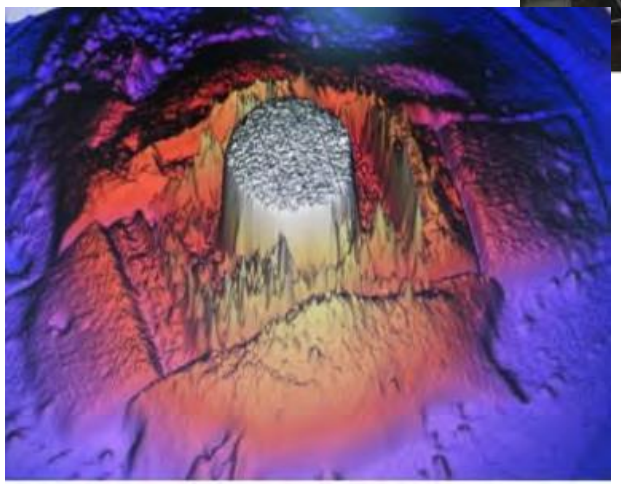
Installation: Solar Furnace SF40, HSF - CIEMAT-PSA

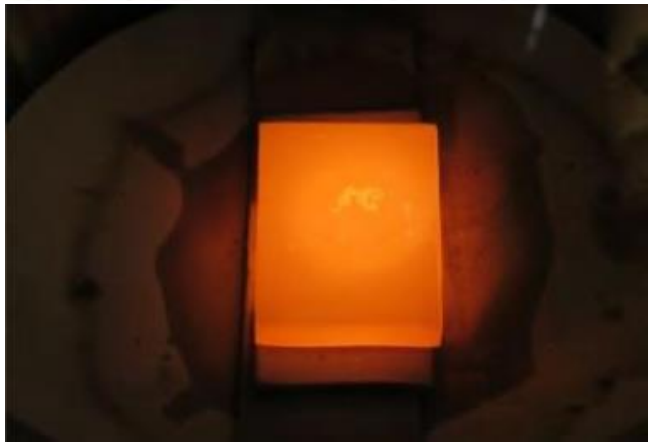
User Group Home Institution: Piraeus University of Applied Sciences, Greece

Objective: This project aims to investigate the exploitation of concentrated solar technology for the in-situ production of anti-wear, carbide-based coatings (TiC, WC, Cr3C2, SiC) from their respective powders, onto steel substrates.

Success stories







Experiment: The three solar test campaigns carried out in the SF40 solar furnace between 2014 and 2016 were successful for all applied treatment parameters (type of powder, dwell time and atmosphere). Also, special experiments were carried out in order to investigate the influence of post-elaboration re-melting (double solar exposure)

Success stories

Achievements: Microscopic observations on specimens' cross-sections verified the excellent incorporation of TiC, WC and Cr_3C_2 powders within the base metal, resulting in surface layers free from defects (pores, cracks) with a homogeneous distribution of the carbide particles. Microhardness measurements on cross sections indicated high values 2500-2900 HV0.3, in the case of TiC-based layers and 1400-1700 HV0.3, in the case of WC-based ones. Both TiC-based, WC-based and Cr_3C_2-based surface layers obtained by the proposed «solar treatment», exhibit high wear resistance, superior to that of the base metal (pin-on-disk tests)

Success stories

Project: **Removal of emerging contaminants and pathogens from wastewaters by using advanced technologies (EconPath)**

Installation: Disinfection installation, DISINF - CIEMAT-PSA

User Group Home Institution: Faculdade de Engenharia da Universidade do Porto (FEUP), Portugal

Objective. The main objective of the project was to assess the efficiency of two solar AOPs (heterogeneous photocatalysis and photo-Fenton process), and two different heterogeneous catalysts (TiO_2 and GO-TiO_2) at pilot plant scale, used for the Removal of emerging contaminants and pathogens from urban wastewater effluents (UWWEs)

Success stories

Experiment. Various experimental conditions were performed namely: Dark experiments with GO-TiO_2; dark experiments without catalyst; photocatalysis using TiO_2 P25; photocatalysis using TiO_2 (prepared by the same methodology as for GO-TiO_2); photocatalysis using GO-TiO_2; UV/H_2O_2 experiments; photo-Fenton experiments; $_{GO\text{-}TiO2}$ reutilization experiments (3 cycles); photocatalysis using GO-TiO_2 (distilled water matrix); photocatalysis using TiO_2 P25 and H_2O2; photocatalysis using GO-TiO_2 and $H2O_2$.

Success stories

Achievements. Among different solar-driven oxidation processes, TiO_2+H_2O_2 was the most efficient process for the removal of organic micropollutants. A decrease in the abundance of antibiotic resistant and total faecal coliforms and enterococci was found for all the studied oxidation processes, which was kept after 3-days storage of the treated water.

Success stories

Achievements. However, non-assisted H_2O_2 processes were not able to reduce the total bacterial load, assessed by the abundance of the 16S rRNA gene. Nevertheless, after 3-days storage the abundance of this gene increased to values close or higher than those found before treatment. The temperature was monitored in order to study its effect on microbial load. It was verified that the microbial load decreases with the increase of the temperature, what was also expected.

THANK YOU FOR YOUR ATTENTION!
ANY QUESTIONS?

Ricardo Sánchez

Solar Facilities for the European Research Area