

## D 2.2

### Reports of min. 3 (young) researchers of SOLARIS at HN or ALBA (period I)

Project acronym: Sylinda

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**Document History**

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<b>PU</b>	Public	v
<b>PP</b>	Restricted to other programme participants (including the Commission Services)	
<b>RE</b>	Restricted to a group specified by the consortium (including Commission Services)	
<b>CO</b>	Confidential, only for members of the consortium (including Commission Services)	

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16.10.2024	2.0	Additional justification at the request of the Project Officer	Magdalena Żychowska
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Since the minor deviations between description of the deliverable 2.2 occurred in: 1) the targeted group of scientists, 2) the facilities at which the visits took place, and 3) the scope of the stays, we would like to justify the nature of these discrepancies.

Ad 1) The definition of early stage researcher (ESR) given in the call for proposals, due to the specificity of the SOLARIS Centre, which operates as a large-scale research infrastructure, has been extended (as internally agreed) to include not only people on the classical academic track, but also technicians, engineers and IT experts who support the research process and the creation of innovations.

In addition, SOLARIS Centre was created as a green field project, the first open access laboratory of this scale in Poland. The classification of employees into the "early stage" category in the case of SOLARIS as well as any other cutting-edge research infrastructures is therefore not directly linked with their age. This is due to the circumstances of forced breaks in a scientific career, caused by, among others:

1. several years of full involvement in the design, construction and launch of unique research infrastructure,
2. the need to abandon their current scientific path and retrain in research using synchrotron radiation
3. family circumstances related to maternity and parental leave.

The groups of ESRs or young scientists who participated in internships at Sylinda are as follows:

- ✓ **Young researchers who have not been granted a doctoral degree: Marcin Brzyski, Marcel Piszak**
- ✓ **Young researchers who have been granted a doctoral degree, however, training took place no later than 5 years after the defense of the doctorate: Joanna Sławek**
- ✓ **Researchers who are not young scientists (their defense took place later than 10 years prior to training), however, in parallel, breaks in their scientific career occurred: Ewa Partyka – Jankowska** defended her doctorate in 2006; however, between the time of the defense and her visit to KIT, she was twice on maternity leave. In addition, the scientific scope of her doctoral thesis significantly differed from the duties at SOLARIS, which required retraining. During that time she has also actively participated in beamline construction.

Ad 2) Short-term internships were held at ALBA, HN and German facilities (KIT and DESY), which cooperate closely with HN. Since HN does not have a synchrotron based laboratories, however, it does have qualified scientific and management professionals, it was decided that visits would take place at synchrotron facilities with simultaneous support from HN personnel. This approach allowed a large number of SOLARIS scientists to experience the research techniques of large RIs with simultaneous assistance from qualified HN personnel in terms of science management. The shortened visits allowed more SOLARIS scientists to participate in exchanges and knowledge enhancement.

Ad 3) Since researchers from SOLARIS visited ALBA to expand knowledge how to provide scientific services to the industry and visited RIs located in Germany to expand knowledge about different aspects of science management, additional supplements to their visits are included in Appendix 1.

Regarding Work Package 2 under which the deliverable was performed, when viewed holistically, it follows a cascading approach. The first significant event initiating the science management training process was the Summer School (Del. 2.1), followed by internships, culminating in participation in the Industry Workshop (Del. 4.2). During this training process, the same early stage and young researchers participate in each step to acquire the full range of qualifications. Therefore, the assumed goal was acquired for the theoretical knowledge during the summer school to be applied to the specific situation of a given participant during the study visit, which means that the topics of scientific research naturally appear in the reports from the visits.

Summaries of the visits are attached below:

Name	Affiliation:	Destination:	Dates:
Joanna Sławek	SOLARIS	ALBA	23.04-29.04.2023

The visit to the ALBA synchrotron was primarily aimed at gathering information on cooperation with industrial users. During my stay at ALBA, I had the opportunity to personally meet the director and representatives of the Industrial Office. We discussed many topics, the most important of which are how and where to establish cooperation with companies, what types of services we can provide for them, what expectations the industrial client has, and how much measurement time he needs. Meetings with representatives of the Industry Office are particularly important in connection with the construction of a crystallographic beamline on the Solaris synchrotron because it is this type of research that companies are most often interested in.

Another important element of the visit to ALBA was the time spent on the research beamlines, especially on the crystallographic beamline – XALOC. I had the opportunity to talk to beamline operators and discuss the practical aspects of industrial measurements, equipment and laboratory requirements for companies using synchrotron radiation. During the talks, special attention was paid to the automation of measurements, as well as data security and confidentiality.

To sum up, the consultation trip to ALBA, financed by Sylinda Project was significant to me, especially in the context of use of synchrotron radiation by industrial users. The knowledge gained during my stay allows me to understand the need of cooperation with such partners and provide them with the highest level of services offered.

23.05.2023  
Joanna Sławek



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Name	Affiliation:	Destination:	Dates:
Ewa Partyka-Jankowska	SOLARIS	DESY	7-11.03.2023

The purpose of the visit was to get acquainted with the equipment for the *operando* XAS technique used by the group of dr Dmitry Doronkin from KIT (a close collaborator of dr Henning Lichtenberg from Hochschule Niederrhein University of Applied Sciences) during the XAS experiment at the P64 beamline (PETRA III). Dr Dmitry Doronkin is an expert in the field of catalysis especially in *operando* X-ray techniques for following the structure, fate, and active site of single-atom catalysts and he is willing to share his expertise and experience in the planned upgrade of the ASTRA beamline for *operando* research.

During my visit I had the opportunity to observe during operation, systems built by the group of dr Dmitry Doronkin, such as e.g. a continuous gas flow reactor, capillaries set-ups that enable XAS studies aiming at describing the state dynamics of catalysts under realistic and varying conditions. In particular, in the course of the experiment, the *operando* methods of spectroscopic analysis were exploited under conditions mimicking rapid temperature variations that occur in an automotive exhaust gas aftertreatment system during real driving. This kind of studies are a response to the challenges for example in catalytic emission control for internal combustion engines or to the worldwide transition of energy production from mainly fossil fuels to renewable sources requiring an efficient system for storage and transport of energy.

It is planned, in cooperation with dr. Dmitry Doronkin, to upgrade the ASTRA beamline with systems: reactor with continuous gas flow, capillary heating set-up with gas blower, gas analytics, gas infrastructure enabling *operando* studies of catalytic systems that are indispensable in applied absorption spectroscopy.



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06.04.2023  
Partyka-Jankowska



Name	Affiliation:	Destination:	Dates:
Marcel Piszak	SOLARIS	KIT	7-10.02.2023

The visit to Karlsruhe Institute of Technology was focused on technical discussions on refinement of ASTRA beamline Double Crystal Monochromator performance and introduction to RAMAN spectroscopy and *in situ* experimentation equipment and methods. First part of visit took part in KARA synchrotron radiation facility located in Campus North. INE Beamline was of the particular interest because it uses the same Lemmonier-type design of Double Crystal Monochromator as ASTRA beamline in Solaris, thus providing unique opportunity for exchange of experiences. The discussion with beamline scientists at INE beamline focused on the motorization of Bragg axis and individual crystals, mechanical alignment of crystal assemblies, requirements for new parts manufacturing and developments on precision monochromatic beam positioning. Principles of high-energy resolution spectroscopy at XAS beamline were also discussed. Second part of the visit took part at the Institute for Chemical Technology and Polymer Chemistry (ITPC) where various laboratories were visited. The technical discussions started on RAMAN spectroscopy equipment and its possibilities for integration at XAS beamline. The continuation of discussion focused on various *in situ* experiments that present value for the industry and could be realised at XAS beamline, among them experiments realised using capillary samples with gas flow and heating, systems to provide temperature control and units providing gas mixing.

22.06.2023 v. Marcel Piszak



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Name	Affiliation:	Destination:	Dates:
Marcin Brzyski	SOLARIS	ALBA Synchrotron	20-26.11.2022

Visit in ALBA Synchrotron was connected to increasing technical and technological knowledge of beamlines measuring equipment aspects. The main tasks and meetings were concentrated in five days. The most important topics covered on each day are presented below.

**Monday:**

- Synchrotron Guide Tour.
- CLAES beamline overview. Presentation of sample holders and manipulators.

**Tuesday:**

- MIRAS beamline and in-situ sample holders overview.
- Review of the Liquid-Nitrogen sample holder design.

**Wednesday:**

- Presentation of the helium cryostat design (measurement parameters and technical aspects).
- Review of the 3D printing capabilities in the context of sample holders manufacturing.

**Thursday:**

- Presentation of the cryostat assembly. Construction analysis and maintenance.
- Review of the Liquid-Nitrogen sample holder. Presentation of 3D model, thermal MES simulation and parts manufacturing.
- Visit to the MIRAS beamline. Technical aspect of mirror motorization.

**Friday:**

- Visit to the Optics laboratory. Discussion about measurements of manufactured optical elements.
- The Liquid Helium infrastructure overview.
- Visit to the mechanical workshop. Discussion about manufacturing and machining precision metal elements.
- Summary.

Alba Team prepare a great workspace at the synchrotron office area, where it was possible to discuss after meetings and conduct conceptions for solutions that could be introduce in Solaris. Visit in Alba synchrotron was very productive and provided a lot of information about future plans of Astra Beamline modifications.

*Marcin Brzyski*



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## Appendix 1: Supplement to reports after short-term internships

### ***Joanna Sławek***

During my visit to the ALBA synchrotron, I had the opportunity to meet the director and representatives of the Industrial Office in person. We discussed many topics, the most important of which were how and where to establish cooperation with companies, what kind of services we can offer them, what the expectations of industrial customers are and how much measurement time they need. Meetings with Industry Office representatives are particularly important in the context of the construction of a crystallography beamline at the SOLARIS synchrotron. I've recently been appointed Crystallography Beamline Leader and responsible for its construction, so I am very grateful for the opportunity to talk to the beamline scientists about managing the construction project in the light of industry's needs.

I was awarded my Ph.D. in September 2019 and started working at the SOLARIS synchrotron in 2020. From the beginning, I was involved in the design and construction of a crystallography beamline, which was a break in my scientific career. In addition, I had previously worked in research laboratories, so I did not have much experience with synchrotron radiation.

### ***Ewa Partyka-Jankowska***

A very important aspect of the meeting with Dimitry Doronkin's group in Germany (which has not been stressed before) was the discussions on the preparation and management of a successful project. Dr Dimitry Doronkin is a partner in the “Clean circles” project with 22 project leaders from the Technical University of Darmstadt, Darmstadt University of Applied Sciences, the University of Mainz, the Karlsruhe Institute of Technology and the DLR Institute of Low CO<sub>2</sub> Industrial Processes in Cottbus. The scientific core of Clean Circles is an innovative energy-material cycle as a central component of the energy transition. This is a very large project linking many scientific partners. This working meeting gave me also a chance to gain additional knowledge about building a scientific network, raising funds for research, including in cooperation with industry, and I learned about the challenges of managing such large-scale projects.

### ***Marcel Piszak***

The visit to Karlsruhe Institute of Technology highlighted cooperation with industry, focusing on the design of in situ experimentation instrumentation for beamlines. During ITPC part of the visit, discussions were carried out on the use of capillary samples with gas flow and heating, along with gas mixing systems, to facilitate high-throughput experiments valuable for industrial

users. Additionally, integrating Raman spectroscopy into the XAS beamline was highlighted, as this would expand experimental capabilities, offering additional methods to industrial users for more comprehensive sample analysis. The importance of handling communication with industrial partners, along with methods for effectively managing R&D projects with an industry partner, was also brought up.

***Marcin Brzyski***

The visit to ALBA Synchrotron highlighted project management, focusing on R&D beamline projects developing. The aspect of balance between using own workshop machinery and cooperation with the industry in implementing R&D projects for better optimization of time and financial expenses of projects was discussed. Automatization of beamline was highlighted, for better adaptation of the beamline to cooperation with the industry. During the visit, the topic of intellectual property protection was highlighted in relation to R&D design of beamlines and in-situ cells. The topic of data transfer as part of joint projects between ALBA and SOLARIS synchrotrons was also discussed.