



D5.1. Technology Advisory Board established

Project acronym: Sylinda

Project full title: Synchrotron Light Industry Applications

Grant agreement no.: 952148

Version: 1.0

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Due Date of Deliverable: 31/12/2021

Completion Date of Deliverable: 03/08/2021

Lead partner for deliverable: Jagiellonian University

Project funded by the European Commission within the Horizon 2020 programme		
Dissemination Level		
PU	Public	✓
PP	Restricted to other programme participants (including the Commission Services)	
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This project has received funding from the European Union's Horizon 2020 research and innovation programme under grant agreement No. 952148.



Tentative agenda for the 1st meeting of the SYLINDA “Technical Advisory Board” (TAB) on August 3, 2021, 9.00 a.m.

Members of the TAB:

Klaus Attenkofer (ALBA)
Jost Göttert (Hochschule Niederrhein HN)
Josef Hormes (Bonn University) Chair
Jozef Korecki (SOLARIS, Polish Academy of Sciences)

Henning Lichtenberg (HN, Innovation Manager, Secretary of TAB)

Proposed permanent guests of the TAB

Piotr Ciochoń (SOLARIS)
Alexey Maximenko (SOLARIS)
Michał Młynarczyk (SOLARIS)
Alejandro Sanchez (ALBA)

Agenda

Welcome (J.H.)

Round of Introductions

“Permanent guests”

The “Physics” of the SYLINDA project (J.H.)

Status SOLABS beamline (H. Lichtenberg)

Upgrade of the SOLABS beamline

Miscellaneous (Industrial customers, Date for the next meeting...)





**SYLINDA Synchrotron Light Industry Applications
(grant agreement No. 952148)**

Technology Advisory Board Meeting - Minutes

3rd of August 2021, 9.00 am (on-line)

Guests (joined meeting at 9.30 am): Piotr Ciochoń, Alexey Maximenko, Michał Młynarczyk, Alejandro Sanchez

Present: Klaus Attenkofer, Jost Göttert, Josef Hormes (chair), Jozef Korecki, Henning Lichtenberg

Excused: none

1. Welcome (JH):

Josef Hormes opened the meeting and welcomed the members of the Sylinda Technology Advisory Board (TAB) to this early Kick-Off meeting. The TAB, one of Sylinda's many committees, has basically two major tasks:

- i) To review hard and software as well as possible technical upgrades of the new SOLABS (XAS-HN) beamline and to give advice how to optimize it
- ii) To evaluate industrial projects at SOLABS as soon as they have been initiated

2. Round of Introductions:

The members of the TAB introduced themselves: Klaus Attenkofer (KA, ALBA synchrotron), Jost Göttert (JG, Hochschule Niederrhein University of Applied Sciences), Josef Hormes (JH, Bonn University, TAB chair), Jozef Korecki (JK, SOLARIS, Polish Academy of Sciences), Henning Lichtenberg (HL, Hochschule Niederrhein, Sylinda Innovation Manager, secretary of TAB).

3. 'Permanent Guests':

JH proposed to include four additional persons involved in topics to be discussed by the TAB – specifically questions related to Sylinda's administration, the installation and commissioning of the SOLABS beamline and the initiation of industrial projects at SOLARIS - as 'permanent guests': Piotr Ciochoń (PC, SOLARIS, Sylinda Industrial Liaison Officer), Alexey Maximenko (AM, SOLARIS, as Sylinda Beamline Scientist heavily involved in the SOLABS beamline build-up, in close cooperation with HL), Michał Młynarczyk (MM, SOLARIS), Alejandro Sanchez (AS, ALBA). Thus, one of the first topics on the agenda of this TAB meeting was to discuss and decide about these persons' guest status by vote. After approval by the TAB they were supposed to be able (and invited) to join the meeting at ~ 9.30 a.m.

KA asked whether the TAB is solely an advisory committee commenting on the technical concepts of the beamline or also authorized to enforce decisions in this context and pointed out that the selection of 'permanent guests' at the TAB meetings depends on this question, esp. if persons directly involved in building up the SOLABS beamline are supposed to be among these guests. JH replied that at this point the TAB merely acts as an advisory committee for Sylinda. In his opinion it definitely makes sense to have the proposed guests on the TAB: PC as Sylinda Industrial Liaison Officer is well informed about and actively establishing industrial collaborations between SOLARIS and industrial partners, AS is responsible for industry contacts at ALBA, MM as chief Sylinda coordinator has direct contact to the EU representatives responsible for Sylinda, and AM is (like HL) directly and almost full-time involved in building up SOLABS and therefore has all information





about the beamline. This information is essential for the TAB in order to give advice. It was not yet clear whether the TAB acts merely as an advisory committee or can also enforce decisions, but at this point including the proposed guests would provide the best source of information about the beamline status. JK agreed that best way to advise people directly involved in building up the beamline is to have them present at the TAB meetings. JH proposed to decide at a later point in which direction to go, after consulting with the Sylinda Executive Board. One possibility would be to later split up in a technical group and an advisory group, but for now the goal should be to have access to information from both sides. At least to this kick-off meeting the proposed guests should be invited. All TAB members agreed to this. After joining the meeting, the four guests were informed that until further notice they have the status of temporary guests.

4. The 'Physics' of the SYLINDA Project (JH)

JH introduced the spectrometer for high energy resolution fluorescence detection to be installed at the SOLABS beamline as part of the Sylinda project. Currently this device is at Bonn University, and he hopes to be able to test it in detail soon. It was previously used at the ANKA synchrotron. JH will send the TAB some details of spectrometer on three powerpoint slides which HL will distribute among the TAB members along with the minutes of the meeting. He hopes that the energy range of the spectrometer can be extended to include the K absorption edges of chemical elements between aluminum and to selenium. It is not supposed to be used for Resonant Inelastic X-ray Scattering (RIXS), but primarily for High Energy Resolution Fluorescence Detection (HERFD) X-ray absorption spectroscopy. There are two 'spectrometer cores' available, one of which is almost ready (detector needs to be replaced) while the other one can still be modified (to be discussed at the TAB).

5. Status SOLABS Beamline (HL)

HL summarized the status of the SOLABS beamline project, a collaboration between Hochschule Niederrhein University of Applied Sciences (HN), the Synchrotron Light Research Institute (SLRI) in Thailand and Bonn University with support from the Center for Advanced Microstructures and Devices (CAMD, USA). These project partners developed and built beamline components most of which have already been installed and tested at SOLARIS. Technical details are summarized in the publication 'A new SOLARIS beamline optimized for X-ray spectroscopy in the tender energy range' by J. Hormes et al. in *Nuclear Instruments and Methods in Physics Research Section B: Beam Interactions with Materials and Atoms* 489, p. 76–81 (2021, DOI: 10.1016/j.nimb.2020.12.017). Significant delays in the beamline project were primarily caused by the Corona pandemic, HN's decision re-write parts of the software and technical problems with the X-ray monochromator (built by Bonn Univ.) which is still in Krefeld, where some additional mechanical work and several tests were required to obtain a fixed exit beam. It will be equipped with fiducial holders for optical alignment and then transported to SOLARIS in August/September 2021. Immediately afterwards, beamline commissioning will begin, i.e. installation and optical alignment of the monochromator. In parallel, the signal processing chain and the partially re-programmed experiment control and data acquisition software provided by SLRI (which had to be adapted to the hardware provided by HN and Bonn University) will be tested. The first goal is to measure X-ray absorption (XANES/EXAFS) spectra of reference compounds in transmission mode with ionization chambers. The second short-term objective for late 2021 is to integrate an already purchased Si-Drift detector into the beamline and measure fluorescence mode XAS and XRF spectra. With respect to the time plan, also Sylinda's technical milestones, specifically optimization of the beamline for measuring low Z elements and integrating the high resolution fluorescence spectrometer (should be up and running 18 months after Sylinda started), must be taken into account, apart from attracting young academic researchers and industrial cooperation partners. HL reported that beyond the equipment for the above mentioned 'basic





functionality of the beamline, several additional devices for making the beamline attractive for applied research have already been purchased or successfully applied for: A hexapod for motorized (later automated) sample positioning and grazing incidence experiments, a motorized linear drive with vacuum feedthrough for sample positioning during low energy measurements (esp. relevant for Sylinda), a hot air blower for sample heating and an X-ray camera.

AM pointed out that a longer SOLARIS shutdown, starting from early 2022 until May 2022, increases the pressure to put the beamline into (user) operation as soon as possible.

6. Upgrade of the SOLABS Beamline

AM and HL sometimes have to propose technical upgrades of the beamline at short notice when additional Polish or German funding opportunities arise. In JH's opinion it is important to find out whether specific upgrades are particularly interesting for the beamline users. It is also important to follow upgrades at other beamlines and adopt them as far as they make sense, while at the same time aiming at innovative upgrades which will be unique for SOLABS. MM pointed out that special attention should be paid to upgrades which are not available at comparable beamlines, e.g. at SLRI and CAMD, and will therefore be complementary to the experimental capabilities at those facilities. For the German TAB members it is hard to identify the specific research interests of the potential Polish users: Catalysis? Surface science? Magnetic dichroism? There are various options. Furthermore, the specific requirements of researchers from HN (especially the HIT Institute of Surface Technology) should be taken into account. JG (leader of HIT) said that currently the highest priority is putting the beamline into operation. In general, his interests lie in the field of coatings/adhesives (e.g. corrosion prevention), and it is essential to develop ideas to relate basic science and the demands of industrial users. Concerning the requirements of Polish users JK mentioned that (based on beamtime applications) there is a huge demand for a straightforward XAS beamline for standard measurements (powder samples, simple sample environments), so even in 'basic operation' without elaborate technical upgrades SOLABS will fill a gap and attract many users. He agreed with JG that making standard XAS measurements possible at SOLABS as soon as possible should have the highest priority. Consequently, at this point one should focus on standard XAS and postpone decisions about upgrades to a later time. On the other hand the Polish user community is not very large, and many potential users still need to be convinced (and some may find it easier to travel to other European synchrotrons instead of SOLARIS). The potential of standard XAS measurements in the field of Chemistry is well known, whereas Physicists often tend to request more advanced sample environments (e.g. low temperature, magnetism). One should also be aware that SOLABS' energy range, which members of the XAS community consider 'low', is higher than the photon energies used at most other SOLARIS beamlines operating up to now. The annual 'Joint Meeting of the Polish Synchrotron Radiation Society and SOLARIS Users' is considered a good opportunity to discuss the specific interests of Polish users in 2022, when the beamline will definitely be up and running.

7. Industrial Customers

PC reported on his successful outreach to potential industrial collaboration partners during the last months. As a first pilot experiment he acquired some samples from a company. XRF and XAS spectra of these samples were recorded by JH at the CAMD synchrotron (USA) and are currently analyzed by him. However, in the future the industrial partners should provide more information about the samples to be measured and clearly define the absorption edges at which XAS spectra should be measured. Otherwise, the scientist at the beamline first needs to record XRF spectra and, based on this data, decide which chemical elements in the samples provide sufficient fluorescence intensities for high XAS data quality, or he/she must speculate about the elements responsible for the relevant materials properties (and therefore interesting for XAS studies).





This process requires too many measurements; it is inefficient, time consuming and would therefore be extremely expensive for the industrial partners if being charged for beamtime. PC reported that in general, several companies wait for SOLABS to be ready for user operation, and some non-disclosure agreements were already negotiated. The Sylinda Summer School in April 2022 will give young researchers an opportunity to learn how to collaborate with the industry.

8. Miscellaneous, Date for the next Meeting

JH concluded that especially with respect to the status of the (permanent or temporary guests), the influence of the TAB (merely advisory or also authorized to enforce technical decisions about the beamline) needs to be clarified with the Sylinda Executive Board. HL will distribute the powerpoint slides he presented at this meeting along with JH's slides about the high resolution fluorescence spectrometer and a link to a Zoom recording of the last 30 minutes of today's meeting which some participants missed. JH will suggest a date for the next TAB meeting which should take place in November 2021, but not between the 16th and 23rd of November (during that time AS and KA will not be available because of the ALBA SAC meeting on Nov 22/23 and its preparation). HL will set up an on-line poll to find a date suitable for all TAB members and guests.

