

Section Review Life Sciences

Structural Cell and Tissue Biology Program

The Structural Cell and Tissue Biology Program within the Life Science Section

The Structural Cell and Tissue Biology (SCTB) Program at ALBA is a part of the Life Science Section; it is devoted to provide and develop instrumentation and knowhow to the user community for imaging structures of cell organelles, cells and tissues, and study their interaction mechanisms, relevant to biological systems or to medical applications. The program consists currently of (i) MISTRAL, a mature full field soft X-ray microscope which saw in 2012 its first light and has developed since a stable and productive user program, (ii) MIRAS, a far to near Infrared microscopy beamline operating since 2016, (iii) FAXTOR, a hard X-ray tomography beamline currently under construction and available for user operation in 2023, (iv) a Cryo- 3DSIM microscope in the final stage of development to be used as a microscope to correlate MISTRAL data with other microscopies employed in research centers, and (v) a cell and tissue laboratory infrastructure, currently P2-level.

Focusing the in-house research program of the section on multimodal, multi-length scale imaging, the staff of the section is developing new methodologies in pilot projects by integrating the structural molecular biology tools of the section ultimately allowing molecular understanding of processes important to life.

Goal of the review

The goal of the review is an assessment of the current capabilities, their effectivity as an infrastructure for the Spanish community, and its competitiveness in comparison to the European and international community. Based on this assessment, the review will also evaluate the strategy of the program and its implementation plan for ALBA II. The review with its documentation and review report will be used to define the mission of the future program and will be the guideline for completing the instrument and support infrastructure allowing to fulfill this mission.

Format of the review

The review will be performed in a digital form by internationally renowned experts including one community representative. Additionally, an AUSE representative will participate as a non-voting member. The committee will be presented with the review agenda and the review documentation at least 2 weeks before the review will take place. The Review will include:

- Written review documents describing mission statement, the SMB program, status of the current program, the strategy for ALBA II with additional information about risks and details to the tactical plan.
- Recorded presentations.
- Executive session.
- Final review remarks to management.

Charge Questions

Current program

1. **Mission:**

- a. Is the scientific goal of the program clearly defined?
- b. Does the mission result in a clear branding of the imaging effort at ALBA?
- c. Is the mission addressing the needs of the Spanish community and the green deal initiative of the European research council?
- d. Are there additional potential user communities which can benefit from the programs mission?

- e. Does the mission support the proprietary user community?
- f. Is the productivity of the program appropriate for supporting the mission?
- 2. **Existing Tools:**
 - a. Are the efforts of the three areas appropriate to fulfill the mission, the existing user needs, and the potential user community needs?
 - b. Are there any investments (workforce, instrumentation, laboratory infrastructure) which would significantly benefit the synergy between the three areas or would such an investment benefit a large and/or important community.
- 3. **Policy Issues:**
 - a. Is the access policy for public users clear and appropriate?
 - b. Is the access policy for proprietary users clear and appropriate?
 - c. Are the available access modes effective in providing intime the necessary resources?
 - d. Is the concept of strategic partnerships well defined and is there a clear synergy between strategic partnerships and users?

Strategy for upgrade:

- 4. **Gap analysis:**
 - a. Is there a need to refine the mission statement?
 - b. Is it clearly stated what tools have to be updated, added, or removed?
 - c. Is the scope of the upgrade of all tools clear and appropriate to address the mission?
 - d. Are there any tools missing to support the mission?
 - e. Is the program benefitting from an 4th generation upgrade?
- 5. **Upgrade plan:**
 - a. Does a basic upgrade plan exist which lines out high-level milestones, rough time lines and necessary resources?
 - b. Are the upgrade plans realistic under the expectation that all requested resources are available?
 - c. Are the prioritization of the different upgrade plans appropriate to fulfill in the best way the mission?
 - d. Is the upgrade plan consistent with minimized impact on operations of the program?
- 6. **New tools:**
 - a. Bio-STXM (scanning X-ray Transmission cryo-Microscopy) Beamline:
 - i. Is the science case for a bio-STXM beamline convincing and addressing the mission?
 - ii. Is the scope of the beamline (nanoXRF, phase-contrast transmission microscopy) clearly defined?
 - b. Cryo-SXM (Cryo soft X-ray microscope, MISTRAL):
 - i. Is the science case for the upgrade of the cryo-SXM beamline convincing and addressing the mission?
 - ii. Are the instrument's specifications appropriate to fulfill the mission?
 - iii. Is the scope of the upgrade clearly defined?
 - iv. Are the proposed correlative microscopies (cryo-3DSIM) appropriate to support the beamline and other X-ray based tools in the program?
 - c. Cryo-EM tomography:
 - i. Is the science case for the cryo-EM tomography program at ALBA (which includes cryo-FIB SEM for sample preparation and screening microscope for CryoET) convincing and addressing the mission?
 - ii. Is the partnership strategy for the cryo-EM tomography (which outsources the final experiments to the Spanish National Facility for Microscopy) suitable for ALBA, given the current scientific policy boundary conditions?

- iii. Would this strategy severely impact the the operation in a user program?
 - iv. Should this strategy be changed in case the growth of the community in the mid/long-term future was significant, as expected? To which direction, if any?
- d. FTIR developments:
 - i. Is the science case for the FTIR developments convincing and addressing the mission?
 - ii. Are the instrument's specifications appropriate to fulfill the mission?
 - iii. Are the priority given to the developments (from more to less priority: live cells, Raman, THz, nanoIR) optimizing the accomplishment of the mission?
- e. μ -CT developments (FAXTOR):
 - i. Is the science case for the μ -CT developments (towards sub μ -CT for phase contrast imaging and sub μ -XANES) convincing and addressing the mission?
 - ii. Would the μ -CT and the sub μ -CT complement with the existing and planned tools at ALBA?
 - iii. Is the decision of disregarding the High Energy CT beamline (biomedical BL) suitable given the current developments of the technique, the resources of ALBA, the Spanish scientific community, the plans for ALBA2 and the ALBA mission?
- f. Data management and scientific data analysis:
 - i. Is the proposed scope satisfying the expected needs?
 - ii. Is the planned organization structure and proposed resources appropriate to satisfy the needs?
 - iii. Are the planned resources appropriate to provide the scope?

Review report

The review report in combination with the provided review documentation will be an important document which will form the bases and justification for the scientific case and the preliminary design report of all upgrade activities of ALBA II correlated with the MX program.

The review chair will be responsible to coordinate the review comments from all reviewers and she/he will deliver the report after four weeks to ALBA management.

A template will be provided addressing the following sections:

1. Information about the reviewer team.
2. Abstract: This part will summarize key findings and recommendations.
3. Charge questions: Answer to all charge questions.
4. Challenges: Any challenges, problems, or risks not addressed in the review.