Appendix A –
Description of the subject of the contract for the delivery of an X-ray microscope for the PolyX beamline at the SOLARIS National Synchrotron Radiation Centre

2021-05-19

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1. INTRODUCTION

The subject of the contract is the delivery of a white-beam X-ray imaging microscope for the PolyX beamline at the SOLARIS National Synchrotron Radiation Centre. PolyX is planned as a general purpose multimodal beamline for X-ray micro-imaging and micro-spectroscopy.

The scope of supply is a microscope suitable for imaging using both white and monochromatic beams at PolyX. The microscope will be used for X-ray imaging and tomography. At 10x magnification the resolution limit of the microscope optics should be better or equal to 1.2 µm @ 550 nm.

2. TECHNICAL SPECIFICATION

The white beam microscope should be equipped with a head for 2X to 10X objectives

1. Microscope frame

- Microscope frame with mounting interface

- Objective fast mounting with dovetail support

- Filter housing

- Step motor controlled objective focusing (mechanical end switches).

2. Rotatable camera support

- Rotation on bearings, step motor actuator

- Direct mounting (no eyepiece)

- PCO Edge 5.5 cameras interface (F-mount and mounting brackets) – camera not included

3. White beam microscope scintillator low magnification head

- Compact white beam head design

- Venting ports to flush the head internal volume and avoid mirror corrosion by ozone

- The microscope should be delivered with one low magnification head suitable for 2/0.055 - 5X/0.14 - 7.5X/0.21 - 10X/0.28 objectives

- The microscope should be suitable for future upgrade by adding a second high magnification head suitable for 5X/0.14 - 7.5X/0.21 - 10X/0.28 and 20X/0.42 objectives, in this case low and high magnification heads will be exchanged by the user

4. Bending mirror between scintillator and objective

- Microscope delivered with one 4 mm thick glassy carbon mirror(s) on low magnification head

- The low Z glassy carbon material reduces the X-Ray backscattering on the mirror, this limits the objective irradiation and improves the image quality.

5. Long working distance (Wd= 26 mm – 30 mm) objectives with enhanced lead glass protection

- 2X/0.055 objective with 4 mm thick front lead glass protection

- 5X/0.14 objective with 4 mm thick front lead glass protection

- 10X/0.28 objective with 4 mm thick front lead glass protection

- Each objective supplied with one individual dovetail support for quick objective exchange.

6. Scintillators and scintillator supports

- Square 12mm x 12 mm x 0.2mm LuAG:Ce scintillator for 2X objective, with spring mounted Tiltable scintillator support for 12x12 scintillators

- Square 8mm x 8 mm x 0.05mm LuAG:Ce scintillator for 5X objective, with spring mounted Tiltable scintillator support for 8x8 scintillators

- Ring mounted 10µm thick LuAG:Ce scintillators for 10X objective, with Tiltable scintillator support for ring mounted scintillators

- Each scintillator delivered in a sealed packing and with an individual X-Ray imaging test

7. Step motor controller and cables

- The microscope step motors (focus & camera rotation) will be controlled by the beamline system.

- The microscope should be delivered with a set of electrical connectors matching the electrical, sockets of the instrument. Those connectors will be used by SOLARIS to manufacture the connecting cables to the control system.

8. Online commissioning assistance

Delivery includes online assistance for microscope installation and first tests, either with a lab X-Ray source or on the synchrotron

3. FINAL DESIGN

The final design should contain at least:

1) 3D step file of the microscope (assembly)
2) motor wiring scheme
3) specification of the connectors for anti-ozone venting