



*The **CREA**tion of the Department of Physical Chemistry of Biological Sys**TE**ms [CREATE]*

666295 — CREATE — H2020-WIDESPREAD-2014-2015/H2020-WIDESPREAD-2014-2

Report on the research equipment acquisition
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1. Overview

Prior to the selection of the ERA Chair holder, IPC secured for the new department lab space of 100 m², offices, connection to utilities, phone and internet. Simultaneously, the lab was equipped in furniture, fume hood, and air conditioning. Selection of remaining equipment for a new lab and offices was within the sole competence of the ERA Chair holder.

The recruited ERA Chair holder – Professor Maciej Wojtkowski decided to develop at IPC the following research fields:

- **Physical Optics (fundamental studies):**
Spatio-Temporal Optical Coherence manipulation (STOC) /Photothermal imaging
- **Application photonics to biology:**
Dynamics of intracellular organelles in vivo / Noninvasive brain imaging
- **Application of optics to medicine:**
Microscopy and bio-sensing in microfluidic devices / In vivo cellular imaging.

The selected equipment is a result of the decision on the research topics to be studied at the newly established Department of Physical Chemistry of Biological Systems, and synergetic groups.

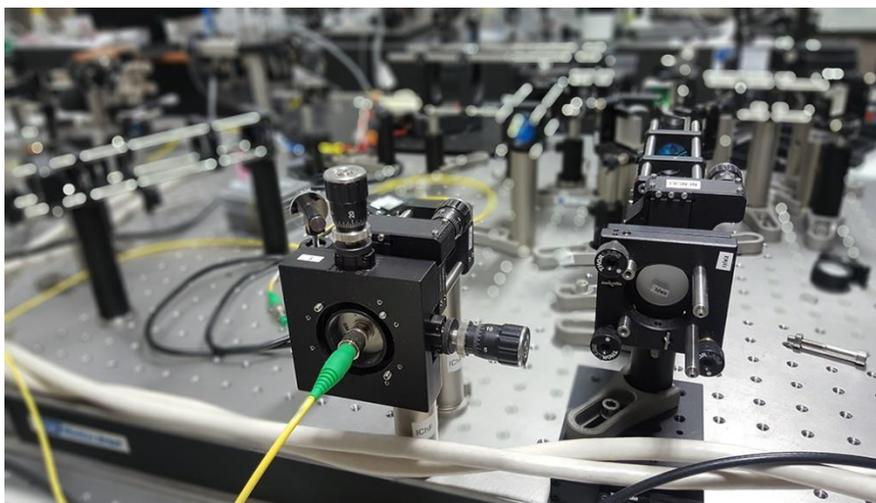
The acquired infrastructure can be classified to the following categories:

- Optical equipment
- IT equipment (hardware & software)
- General office/laboratory equipment.

The total value of the purchased items is ca. **PLN 830,721.46** (ca. **EUR 198,927.55**, exchange rate of the 30th May, 2017; 1 EUR = 4.176 PLN – to be recalculated using the EUR exchange rate applicable for respective reporting period). The detailed information on the purchased equipment is specified in the subsequent parts of this report.

2. Optical equipment

In terms of lab infrastructure, the new department has acquired optical equipment (please see below for a full list) used for all the research activities. Specifically, it is used for building optical setup prototypes. These prototypes will be employed for noninvasive in vivo imaging and analyzing dynamics of biological systems (brain, retina, cells), fundamental studies in statistical optics (e.g. to tailor optical field to effectively control coherence properties of a laser) and photothermal imaging.



Tables and basic equipment listed below is used for optical alignment and calibration of all optical setups.

Equipment	Invoice no.	Committed resources ¹ [PLN]	Justification of purchase
Optical components (multiple elements)	FA/9/2017	156,260.46 ²	Multiple optical components, including: cables, couplers, and other small equipment, necessary for research. Optical components like optical patch cables or fiber couplers are very important in constructing
	FA/27/2017	8,335.30 38,749.58	

¹ i.e. cost of purchase in case of items up to PLN 3,500, and depreciation write-offs calculated till the end of the project in case of items exceeding this amount.

² Including custom duties at the amount of PLN 2,716.08.

	FA/108/2016	53,497.45	optical systems, used for transporting light in a convenient way or mixing beams in interferometric measurements.
	FA/114/2016	8,953.39	
	FVS/16/08/0154	25,684.55	
	20171215	10,022.00	
	20172273	8,302.11	
	201770008720	2,316.44	
	20170004423	399.64	
GS/s, 12 bit waveform digitizer PCI Express bus with FPGA based FFT enhanced processing, with external clock upgrade and software development kit	170099	80,520.08	In order to use the full speed of light sources extremely fast digitizer is required (for processing images taken from camera at high rates). This device allows for building faster and more robust imaging systems.
2 optical tables with pneumatic legs	FA/58/2016	80,010.54	This equipment is necessary to carry out most important experiments in all research areas specified as key-fields of newly established chair (applications of photonics to biology, fundamental studies of physical optics and application of optics in medicine). High quality of tables assures a sufficient vibration damping, which allows for conducting top-class experiments in the department.
Ultra High Speed 650-950 nm OCT spectrometer with a cable	2005 201770010462	ca. <u>61,113.69</u> ³ 49,561.15 11,552.54	Ultrafast spectrometer allows for building imaging systems with femtosecond laser pulses as a light source. Such spectrometer can analyze different wavelength components with high speed.
Amplitude + Phase Modulator, Wavelength: 600 - 900 nm	FA/47/2017	19,867.68	Phase and amplitude modulators are used for manipulation of light beams in optical experiments. Such manipulations are used for testing modern imaging techniques.
High Voltage Amplifier, 20:1 bipolar, +/-200V	FA/47/2017	10,141.32	Amplifier is used for delivering high voltage signals to electronics devices or piezo elements.

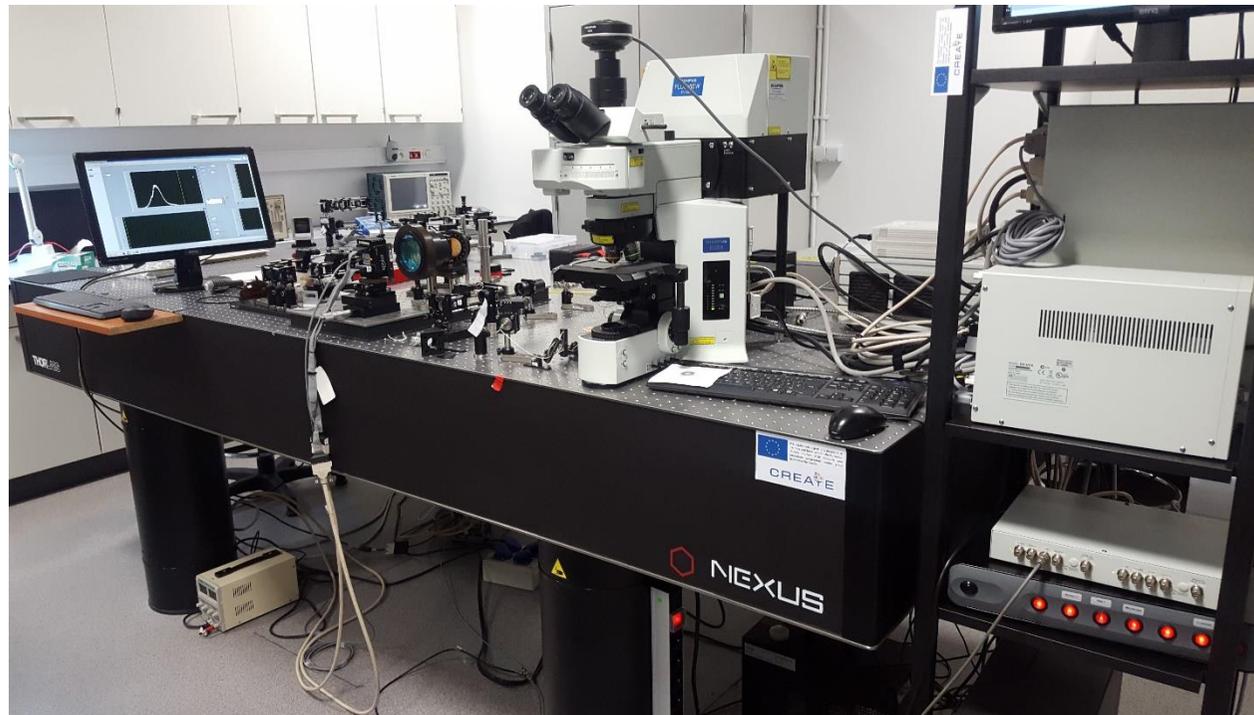
³ Including custom duties at the amount of PLN 362.54.

Video microscope for fiberoptic connector inspection Lightel CCI-1100 LCD	F2017-02-057	8,087.87	This device is necessary to inspect fiber-ends.
0 1" Mounted Achromatic Half-Wave/Quarter-Wave Plates, SMI-Threaded Mount, 690-1200 nm	FA/47/2017	6,961.08	Those plates are used to change the polarization state of light used in imaging systems.
Generator Rigol DG5071	NDN/2016/3260	6,362.97	The generator provides modulated voltage signals, in order to synchronize specific elements interplaying in experiments on Spatio-Temporal Coherence manipulation, and other microscopic techniques.
OCT model eyes	F2017-01-018	5,663.23	Eyeball models are necessary for first phase of testing of newly built OCT-systems, preceding experiments with human or animal subjects, to make sure that all features of new systems are correct and safe.
Dimension Technology Easyget Fiber Endface Inspector	FA/108/2016	5,128.80	This device is used for analysis of light intensities in optical systems.
Optical Fiber Cleaver FITEL S326A	FA/114/2016	4,531.14	Item bought in order to gain possibility of modification of photonics fibers. Such ability ensures variety of options in construction and development of photonic structures, which can be applied in biological research. This device can be used as well for repairing broken fibers.
Spectrometer CCD VIS-IR with fiber optic and software	25/08/2016	4,524.99	Basic inspection tool for analyzing light spectrum, very important for setting up the optical systems (for biological imaging, etc.) and for running diagnostics tests on the devices (light sources).
Compact Power and Energy Meter Console, Digital 4" LCD	FA/9/2017	4,185.19	Power meter console is necessary for convenient beam power measurements.
Oscilloscope	NDN/2016/2884	3,940.20	For analysis of signals from electronical devices, such as photodiodes or other light detectors. Signal from photodiode can be easily detected on oscilloscope, accelerating testing for all sorts of setups. All experiments

			carried out in the new department are connected with light analysis, therefore acquiring the electronical device to properly read these signals was simply necessary.
Fusion splicer Ericsson FSU 975	F2016/09/0011	3,613.07	It is used for fusing fiber, mostly applied in repairing broken fibers and modifying existing photonics.
Optical board	FA/9/2017	3,547.07	Optical boards with proper vibrations damping are inevitable for building optical systems.
GALN THOMPSON POLARIZER, POSITIVE 1931 USAF TEST TARGET	FA/47/2017	2,660.26	To check the performance of the optical system.
CLETOP optical connector cleaner	F2017-04-146	1,664.19	Equipment necessary for fiber cleaning.
Universal voltage meter	39/08/2016	489.01	Instrument measuring voltage
MAGNETIC LASER SAFETY SCREEN	FA/56/2017	137.44	Laser beam blocker, for safety precautions.
DYMO LabelManager	FS 1736/2017	121.99	Item used to mark the acquired equipment.
High-speed recording camera MotionBLITZ EoSensR mini2	in delivery	ca. 86,976.02	Ultrafast camera serves as a tool to acquire images from experiments at extremely high rates. This feature is crucial in many ultrafast experiments, greatly improving robustness of optical systems.
Total cost:		PLN 556,508.29	

3. IT equipment (hardware & software)

As an integral part of the research equipment which is necessary to perform the work in the laboratory. Under the project, IT equipment was purchased to support data analysis, visualization, control over the whole experiment, and exchange of ideas between members of the group or results on reporting sessions. Additionally, to achieve the full functionality of the acquired hardware and to analyze and process all the data collected from the conducted research, several different types of software were purchased.



The purchased items are specified below:

Equipment	Invoice no.	Committed resources ⁴ [PLN]	Justification of purchase
HARDWARE			
HP computer + HP screen + mouse and keyboard	00099/16	24,782.04	Computer serves as data analysis and visualization tool and its features ensure control over the whole experiment.
Frame grabber NI PCIE-1433 with cable	F2017-02-047	16,068.72	Frame grabber is used for handling 2D and line cameras. It allows for acquiring and processing images taken from camera.
iMAC computer	FVS/58/05/17/KK2	13,739.10	This workstation is used for signal and image processing using LabVIEW for Mac. We empirically found that these signal processing routines work much faster on OS X (iMac's and MacBook's) than on Windows controlled machines.
Hard drives (SEAGATE) for fileserver QNAP (x4)	00080/16	5,894.16	For storing and sharing files.
HP Probook 430I5-7200	50/AC/2017	4,071.30	Portable device for controlling experimental apparatus.
Server QNAP TS-853A-4G	00079/16	3,896.64	For storing and sharing files.
Monitors: Philips 243V5LSB/00 (x2), BENQ 9H.L6VLA.DPE (x4)	00077/16 00078/16	<u>2,814.24</u> 1,712.16 1,102.08	High-performance displays for laptops and computers.

⁴ i.e. cost of purchase in case of items up to PLN 3,500, and depreciation write-offs calculated till the end of the project in case of items exceeding this amount.

HP printer CF388A, HP scanner - Scanjet 300	00073/16 00074/16	<u>2,661.72</u> 2,258.28 403.44	Basic equipment for administrative works.
Projector EPSON with HDMI cables	00097/16	2,416.02	Projector supports good exchange of ideas between members of the group during meetings, or results reporting sessions.
Hard drive (SEAGATE portable 2TB) (x5)	00075/16	2,078.70	Portable drives for storage for experimental data.
External portable storage (SEAGATE 5TB)	51/AC/2017	1,247.22	Portable storage for experimental data.
Additional memory banks	FVS/56/05/17/KK2	1,163.58	Memory banks, which extends capabilities of HP Z420 workstation. This banks are used for improvement of a speed of experimental setup (to acquire more data before streaming it to the hard drive).
Hard drive (internal storage SEAGATE 2TB, 3.5") (x3)	00076/16	1,062.72	Internal storage for experimental data.
TP-link router (x2)	00072/16	905.28	Device enhancing and distributing internet signal.
Tiny IT equipment – i.e. hub USB 2.0, mice + keyboards, Apple lighting to AV, pendrive 32 Gb, HDMI cable, TP-Link switch	CW/2016/12/43697 60159913 00018/17	<u>685.23</u> 436.00 140.99 108.24	Supplementary equipment supporting other IT infrastructure usage.
SOFTWARE			
ZEMAX Opticstudio Professional + productivity assurance	20/01/2017	50,814.07	This software is used for optical design and ray tracing. Zemax is a standard and well-established software for optical applications.

LabView (NI Academic Site License)	444/11/2016	47,847.00	Used to interface lab equipment for device control (National Instruments DAQ cards) and data acquisition (National Instruments Framegrabbers). LabVIEW is also used to develop custom signal processing.
Adobe licenses:		<u>30,479.40</u>	Image processing; creating illustrations for publications; PDF editing.
- <i>Photoshop CC</i>	18/MP/2017	13,874.40	
- <i>Illustrator CC</i>	F/2017/000026	13,136.40	
- <i>Acrobat PRO DC CC</i>	F/2017/000244	3,468.60	
SolidWorks Professional	19/01/2017	27,675.00	Standard software for 3D design and visualizations
Matlab + image processing toolbox		<u>13,901.46</u>	Utilized to develop custom scripts for signal and image processing, and also used to build control software.
	17-FVS/01/19	4,429.23	
	17-FVS/01/10	9,472.23	
EndNote	FVP0680/DzO/12/2016	5,446.44	Standard software tool for publishing and managing bibliographies, citations and references.
Microsoft Office	00001/17	1,928.64	Standard software needed for text editing, calculations and data processing, tool for preparing presentations, advanced email client.
Total cost:		PLN 261,578.68	

According to the Public Procurement Law applicable in Poland, delivery of computer hardware and software (excluding keyboards, computer mice, cables, pen drives, coolers, batteries, USB hubs, frame racks and USB memory readers) must be preceded by a public procurement proceedings. Detailed information on the public procurement proceedings referring to the purchase of the abovementioned IT equipment may be found in the table below:

No.	IPC public procurement proceedings no.	Lot no.	Lot subject	Starting date of the public procurement proceedings	Selected contractor	Date of contract conclusion
1	ZP 2401-16/16/	1	Router (TP-Link)	26-10-2016	ASCOMP K Krzysztof Ćwiklak vel Ćwikliński	28.11.2016
2	ZP 2401-16/16/	2	Printer (HP Color Laserjet Pro M452nw, x2)	26-10-2016	ASCOMP K Krzysztof Ćwiklak vel Ćwikliński	28.11.2016
3	ZP 2401-16/16/	3	Scanner (HP Scanjet 300)	26-10-2016	ASCOMP K Krzysztof Ćwiklak vel Ćwikliński	28.11.2016
4	ZP 2401-16/16/	4	Hard drive (external Seagate)	26-10-2016	ASCOMP K Krzysztof Ćwiklak vel Ćwikliński	28.11.2016
5	ZP 2401-16/16/	5	Hard drive (internal Seagate)	26-10-2016	ASCOMP K Krzysztof Ćwiklak vel Ćwikliński	28.11.2016
6	ZP 2401-16/16/	6	Monitor Benq (x4)	26-10-2016	ASCOMP K Krzysztof Ćwiklak vel Ćwikliński	28.11.2016
7	ZP 2401-16/16/	7	Monitor Philips (x2)	26-10-2016	ASCOMP K Krzysztof Ćwiklak vel Ćwikliński	28.11.2016
8	ZP 2401-16/16/	8	Server QNAP	26-10-2016	ASCOMP K Krzysztof Ćwiklak vel Ćwikliński	28.11.2016
9	ZP 2401-16/16/	9	Hard drive NAS	26-10-2016	ASCOMP K Krzysztof Ćwiklak vel Ćwikliński	28.11.2016
10	ZP 2401-16/16/	10	PC (HP workstation + mouse + keyboard + 2x monitor)	26-10-2016	ASCOMP K Krzysztof Ćwiklak vel Ćwikliński	28.11.2016
11	ZP 2401-16/16/	11	Projector (EPSON)	26-10-2016	ASCOMP K Krzysztof Ćwiklak vel Ćwikliński	28.11.2016
12	ZP 2401-16/16/	14	Software - EndNote	26-10-2016	GAMBIT COIS Sp. z o.o.	28.11.2016
13	ZP 2401-16/16/	15	Software - LabView	26-10-2016	KOMEX A Szadkowski Sp. J.	28.11.2016
14	ZP 2401-17/16	1	Software - MS Office	14-12-2016	ASCOMP K Krzysztof Ćwiklak vel Ćwikliński	11.01.2017
15	ZP 2401-17/16	2	Software - Matlab	14-12-2016	ONT Sp z o.o. Sp. K	12.01.2017

16	ZP 2401-17/16	4	Software - Adobe Illustrator	14-12-2016	Restor S. J.	12.01.2017
17	ZP 2401-17/16	6	Software - Solid Works	14-12-2016	Infomiks Sp. z o.o.	12.01.2017
18	ZP 2401-17/16	7	Software - Zemax	14-12-2016	Infomiks Sp. z o.o.	16.01.2017
19	ZP 2401-17/16	38	Router (TP-Link)	14-12-2016	ASCOMP K Krzysztof Ćwiklak vel Ćwikliński	11.01.2017
20	ZP 2401-1/17	2	Software - Adobe Photoshop	22-01-2017	13p Grzegorz Kociumbas	22.02.2017
21	ZP 2401-3/17	19	Software - Adobe Acrobat DC	09-02-2017	Restor S. J.	14.03.2017
22	ZP 2401-6/17	4	Laptop (HP Probook)	28-03-2017	ANNCOMP I Sp. z o.o.	24.04.2017
23	ZP 2401-6/17	5	PC (iMac)	28-03-2017	PARSER Sp. z o.o.	24.04.2017
24	ZP 2401-6/17	6	Hard drive (external Seagate, x2)	28-03-2017	ANNCOMP I Sp. z o.o.	24.04.2017
25	ZP 2401-6/17	7	Memory (RAM, x2)	28-03-2017	PARSER Sp. z o.o.	24.04.2017

4. General office/laboratory equipment

In order to get the newly established laboratory and office ready to accommodate researchers and initiate research activities by the group, some basic office/laboratory equipment were acquired:

Equipment	Invoice no.	Committed resources ⁵ [PLN]
Air conditioning Mitsubishi MSZ-JH25/MUZ-HJ25	1/09/2016	8,000.00
Laboratory cabinets		<u>1,837.85</u>
	295497/8002/2016	138.20
	16-FVS/5795	254.39
	16-FVS/5796	123.00
	2016-14-258779	240.00
	122789/8106/2016	445.78
	132963/8106/2016	101.40
	28942/16	396.88
	302495/8002/2016	138.20
Magnetic whiteboards	FS/147/03/2017	1,211.99
Laboratory lamps	P372402902	553.25
Tiny equipment – i.e. shredders, label manager		<u>866.40</u>
	1506/PB/17	429.00
	FN-321000/2016/08/02599	437.40
Door labels		<u>165.00</u>
	FVL/02/2017/5664	55.00
	FVL/02/2017/6061	55.00
	FVL/02/2017/6804	55.00
	Total cost:	PLN 12,634.49

⁵ i.e. cost of purchase in case of items up to PLN 3,500, and depreciation write-offs calculated till the end of the project in case of items exceeding this amount.