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Abstract:

The negotiation of components takes the ACCORD project from the stage where awards of components are determined, following peer review, to the delivery of components to Universities, setting in action the R&D activities of the ACCORD project.

In this report, we describe the timing and schedule information of all R&D projects accepted in Call 1.

Keyword list:

Photonic components, Optical components, negotiation of contracts and component fabrication.

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1. Executive summary

In this deliverable WP-4 reports the time and schedule of the different research proposals that have submitted and selected in the Call 1 and Call 2. This information is mainly due to highlight the main milestones of the different projects. It will be used as the reference for the follow-up of the projects as well as to evaluate the final result that universities will present at the end of their research work.

The report is divided in 2 parts which have two sections. The first part is dedicated to the Call 1 for proposals accepted projects when the part 2 is for the Call 2 for proposals accepted projects. The first section is an abstract of the project giving the main information about the aim of the project while the second section is the time and schedule of the project that has been provided at the kick-off meeting of the project.

2. Call1 proposals

2.1 *Proposal 109 – St-Andrews University*

2.1.1 Abstract

The combined use of laser technology and microscopy has fuelled a revolutionary advance in cellular and molecular biology. Real-time observation and tracking of cellular processes has yielded a wealth of bioscience. Microscopy techniques such as confocal imaging and two-photon excitation are now relatively standard in microscopes. As already known, the cell membrane represents the outer extremity of all eukaryotic cells. The membrane encloses the cell, defines its boundaries and maintains the essential physio-chemical differences between the cytoplasm and the extracellular environment. Under normal circumstances, the lipid nature of the cell membrane acts as an impermeable barrier to the passage of most water-soluble molecules. Thus, the selective introduction of therapeutic agents to the inside of dysfunctional or diseased cells remains problematic. Few practical approaches for poration exist and these include physical injection into individual cells using glass micropipettes membrane fusion of loaded liposomes, ballistic introduction of coated gold nano-spheres (gene gun), delivery of therapeutic agents encapsulated in membrane permeable shells (vectors), local permeabilisation of cells via the application of pulsed electric fields and local permeabilisation of cells via the application of diagnostic ultrasound (sonoporation). Some methods for puncturing the cell membrane without causing any collateral damage have been devised and importantly, this includes laser-assisted techniques. They aim to develop a new technology for achieving such photoporation using coupled a laser beam from a commercial system Ti:Sapphire laser (MIRA, 785nm@80MHz), 150fs pulse duration, 800mW output peak power to a fibre's tip. The length of the fibre is to be designed to be short enough (up to 40cm) for maintaining the pulse duration in the femtosecond regime. In prior work they have achieved poration using a fs beam in a microscope system. The system will be designed for the following achieving suitable pulse durations (<250fs in short lengths of fibre) • Attaining suitable fluence levels (100MW average power or better) • Beam quality for poration (ensure they gain a good M2 on the light mode) Overall this would allow them to develop new systems of poration of cells that may be compatible with endoscopic technologies of the future allowing the delivery of new drugs at will to cells and tissue of choice. Lovalite technology is a good way to realize very localized light sources in the end of optical fibre and will be tested within the program.

2.1.2 Time and schedule

Component received	Kick-off meeting	Project duration [months]
22.12.2007	21.01.2008	6-9

The experiments will be divided in 3 steps:

A) First test at relatively low power with lovalite tips on single mode fibre. Those tests will require about 20 tips on fibre to evaluate their resistance to the power flux and their behaviour as local light source. The duration of phase A is expected to be 3 months.

B) Test on low dispersion fibre (holey fibre); This test will need about 10 tips and will allow to increase the fibre length to gain more flexibility. The duration of phase B is 3 months and can overlap with phase A.

C) Higher power test. This test will use especially developed sol gel material tips; Phase C will happen only if phase A and C are providing expected results. The duration of phase C is 3 months.

2.2 Proposal 112 – Universidad Politécnica de Madrid

2.2.1 Abstract

Universidad Politécnica de Madrid (UPM) agree to receive the device: All-fibre Stripper, from FIBERLOGIX, to use it and to do all the tests required for evaluating the mechanical strength of the fibres, identifying the cause of weakness, if any, and to propose system upgrading.

2.2.2 Time and Schedule

Component received	Kick-off meeting	Project duration [months]
04.01.2008	04.01.2008	12

The project duration is estimated to 12 months and the planned activities are as follows:

- Definition of stripper basic parameters (performances, detailed dimensions, voltages, velocity, alignment, procedures)
- Comparison between different stripping methods (Fiberlogix stripping machine, sulphuric acid, mechanical stripper).
- Design of tools to modify the height of the fibre with the electrode. Qualification test of this parameter.
- Changes of the electric arc parameter. Qualification test of this parameter.
- Changes of the head velocity. Qualification test of this parameter.
- Definition of the optimal performances.
- Interaction with other applications (splice, grating, etc.)

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2.3 Proposal 102 – Tampere University of Technology

2.3.1 Abstract

They would like to use a short pulse laser Eolite Corus 10G(515nm, 4W) for micromachining of biodegradable implants and grooving&dicing of silicon wafers. Tampere University of Technology (TUT) has established a laser micromachining laboratory in the 'Laser pilot factory'-project (2005-2007). The laboratory can offer facilities and equipment for different laser processes in micro- and nano-scale. Their leading idea is to work between research and commercialization: Laser pilot factory offers facilities and personnel to test new laser microprocessing equipment before it becomes industrially viable solution. They have been working the last 1.5 years with an ultra short pulse fibre laser (in IR-range) and fibre connected diode laser in different applications (wafer grooving, surface structuring, joining glass, plastics , sintering etc). The new UV-laser would be used in M4/Next project (2006-2007), which does research in microfactories and laser micromachining. This project is executed together with the Institute of Biomaterials. The workpackage 'Microfactory for biodegradable implants' concentrates on laser machining. They have done some practical and background research in this area and found out that short pulse UV-laser might fit the purpose perfectly. This project contains also a study of laser micromachining for silicon wafer grooving and dicing, which was now made with an ultra short pulse IR- and UV-laser. UV-laser looks promising in this case also. M4/Nextproject lasts until the end of the year 2007. Their primary target is to get results during this project. However they are prepared to continue this work in next projects (FP7 or domestic funding) during the year 2008.

2.3.2 Time and schedule

Component received	Kick-off meeting	Project duration [months]
22.01.2008	14.01.2008	12

Activity 1: Integration and test (→ 02/08)

Activity 1.1: Integration of the Eolite laser with a scanner
Activity 1.2: Interface of the electronics (laser / scanner controller)
Activity 1.3: Test of the system for micromachining
Activity 1.4: Documentation of integration and test

Activity 2: Laser micromachining of biodegradable implants (→ 04/08)

Activity 2.1: Micromachining of biodegradable polymers
Activity 2.2: Micromachining of composite implants
Activity 2.3: Documentation of parameters, setup and results

Participation in Photonics Europe (7.-11.4.2008) with Accord partners

Activity 3: Laser micromachining of printed electronics (→ 07/08)

Activity 3.1: Micro-sintering of printed silver ink
Activity 3.2: Direct writing in copper films
Activity 3.3: Documentation of parameters, setup and results

Activity 4: Laser micromachining of silicon wafer (→ 09/08)

Activity 4.1: Micromachining of silicon
Activity 4.2: Documentation of parameters, setup and results

Participation in conference X with Accord partners

Activity 5: Laser micromachining of biodegradable implants (→ 11/08)

Activity 5.1: Conference paper on laser micromachining of biodegradable implants

Activity 6: Laser micromachining of printed electronics (→ 11/08)

Activity 6.1: Conference paper on laser micromachining of printed electronics

End of the project: January 2009

Final report

2.4 Proposal 108 – University of Latvia

2.4.1 Abstract

They plan to incorporate the adaptive optics feedback in systems for research vision science and diagnostics of eye posteriors structures. The feedback will consists in performing two stage wavefront error corrections. First deals with “quasistatic errors” – the errors that can be eliminated with regular eye corrective means (goggles, contact lenses) and other lower order aberration terms (i.e., coma and other). In our system we are going to correct these “coarse” aberrations with the first adaptive mirror M1 (with quasistatic or low speed control). The second stage – the “fine” error correction they project to realize with the higher speed error correction, controlling the second adaptive mirror M2, that is set serial to the first one, with the higher speed feedback loop comparing to the first stage. Such solutions will be faster and more flexible, particularly for cases of strong quasistatic aberrations (for people with eye pathologies and after effects of cataract and refractive surgeries). The project will allow them to carry out vision perception experiments using adaptive optics correction of eye impairments; promote studies of eye photoreceptor physiology. They are going to cooperate with Visionica Ltd., who has proposed for the ACCORD program devices “Shack-Hartmann wavefront sensor, real time processor and corrector using unimorph mirrors.”

2.4.2 Time and schedule

Component received	Kick-off meeting	Project duration [months]
31.01.2008	09.02.2008	15

They plan a project duration of 15 months.

I stage (10 month).
Set up of the system with two-stage adaptive optics control of the wavefront errors. Modelling of wavefront errors without human eye, detection of eye aberration and feedback control efficiency studies at different wavefront error amplitude and speed conditions using emission of viusible and infrared lasers. Selection of the technical solution for testing of human eyes.

II stage (5 month).
Application of the system for experiments with human eye. Testing of the system for patients with different strength and different kind of aberrations. Testing with additional passive wavefront error correctors. Psychophysical measurent of subjective vision improvement for stimuli of different contrast, different spational and temporal visual stimuli (monchromatic, colour contrast) recognition. Working out a project for implementation of the system in laser scanning microscopy equipment.

2.5 Proposal 113 – Universidad Politécnica de Valencia

2.5.1 Abstract

The proposal has two objectives: •The development of models to characterise the behaviour of the Semiconductor Optical Amplifiers (SOAs) and optical Electro Absorbers (EAs) •To look for novel application for the Semiconductor Optical Amplifiers and optical Electro Absorbers. To achieve the objectives, the following tasks will be developed: To develop software models using Matlab and VPI software. To check the model of a group of well defined measurements. The use of slow and fast light effects for the processing of microwave signals in the optical domain (Microwave Photonics Applications). SOAs/EAs as low cost components for Access Networks..

2.5.2 Time and Schedule

Component received	Kick-off meeting	Project duration [months]
16.11.2007	11.02.2008	12

This proposal has an estimated duration of 12 months. The steps that are going to be done are the following (although the kick off meeting has been delayed until 11/02/08, task one of the following plan is already underway):

- 1st Task. Characterisation (measurements and model) of the amplitude and phase changes of the SOAs/EAs for the processing of microwave signals in the optical domains (slow and fast light effects). 3 months (Months 1 to 3).
- 2nd Task. Characterisation (measurements and model) of the harmonic distortion created in the microwave signals. 3 moths (Months 2 to 4).
- 3rd Task. Characterisation (measurements and model) of the SOAs/EAs for lowcost Access Network Applications. Basically, checking the linearity of the SOAs/EAs and the proper bias to optimised them. 3 months (Month 3 to 6).
- 4th Task. Development of an application of SOAs/EAs in the microwave photonics field. Mainly a phase-arrayed antenna. 6 months (month 5 to 10).
- 5th Task. Development of an application of SOAs/EAs as low-cost component in the Access Networks. 6 months (month 7 to 12).
- 6th Task. A report of all the activities will be provided to the product supplier. 1 month (month 13).

3. Call2 proposals

3.1 Proposal 203 – Strathclyde university

3.1.1 Abstract

The aim of the project is to develop a multi-wavelength, time multiplexed, spectrometer for atmospheric sensing. The prototype pulsed quantum-cascade (QC) lasers supplied by Cascade Technologies cover a range of wavelengths that are ideal for the proposed project. In the first phase of the project, the QC lasers will be characterised by use of their in-house laboratory-based spectrometers. This will involve checking the wavelength band using a Fourier transform spectrometer and then quantifying the frequency chirp characteristics of the pulsed lasers. The absolute wavenumber range will be obtained using a selection of standard calibration gases. The second phase of the development will consist of redesigning part of their existing spectrometer to incorporate two separate laser heads and their associated multiplexing optics. At a later phase of the development this will be extended to a four- laser system. As part of the development programme they intend to carry out a range of test measurements in Strathclyde University, as well as deploying the instrument in a number of test sites in rural Scotland, as well as at Bristol University. The resulting wavelength multiplex QC laser spectrometer may be compared with the systems of Fowler at the Edinburgh Research Station of the Centre for Ecology and Hydrology (CEH), which uses cooled lead salt lasers, and that of Gallagher of the School of Earth, Atmospheric and Environmental Sciences at the University of Manchester.

3.1.2 Time and Schedule

Component received	Kick-off meeting	Project duration [months]
02.09.2008	02.09.2008	12

Activity	oct.08	nov.08	déc.08	janv.09	févr.09	mars.09	avr.09	mai.09	juin.09	juil.09	août.09	sept.09
Laser installation	Training at Cascade											
Analysis of spectral behaviour and tranverse mode pattern		In house FTS										
Frequency characterisation			Extent and rate of chirp									
Application of single laser to spectroscopy				Sensing of gases such as CH_4, CO_2, Nox, Sox and H_2O								
Development of time multiplexed multiple laser system						Develop techniques for coupling multiple beams, recording and processing data						