

Innovate & Design
Light-Driven
Microbial Communities



PHOTO.COMM News

Welcome to the 1st
newsletter within the
Marie Curie ITN
PHOTO.COMM

07.02.2014



This project is funded by the European Union

Welcome to the 1st PHOTO.COMM News

This news letter will inform you how our project has progressed since it officially started October 2012.

What is PHOTO.COMM?

PHOTO.COMM is a Marie Curie Initial Training Network (ITN) project funded by the European Union. We are a collaborative network of seven European universities and three biotech companies and include 14 fellows with different nationalities. PHOTO.COMM is an acronym for "Design & Engineering of Photosynthetic Communities for Industrial Cultivation", and we seek to design light-driven microbial communities of microalgae or cyanobacteria for sustainable large-scale production of fuels, chemicals and general biomass. The overall aim of the PHOTO.COMM research is to improve the sustainability and economic viability of industrial biotechnological products from microalgae and cyanobacteria.

The primary strategic aim of PHOTO.COMM is to train a new generation of young researchers to meet the incredible challenges involved in this field. The project will last for four years from 2012-2016. See more at our website: <http://photocomm.ku.dk/>



Recruitment news

Our network consists of 14 fellows of which two are postdocs (Experienced Researchers, ERs) and the rest PhD students (Early Stage Researchers, ESRs). All fellows have been hired now and have started their projects with great enthusiasm. Six out of the 14 fellows are female (43 %), and the fellows' nationalities are very mixed: Danish, German, Mexican, Hungarian, New Zealander, South African, Polish, Austrian, Italian, and Bulgarian.

Three of the fellows are based at the industry partners, while the rest are at the universities. However, it is the plan that all fellows situated at the universities should have stays (secondments) at industry partners and vice versa in order to train them for both worlds and to fully exploit the network potential.

You can see an overview of all our fellows at our homepage: <http://photocomm.ku.dk/fellows/> and for each fellow you can download a profile showing their background and current project

In each of the newsletters we will present two of the partners together with the affiliated fellows. In this number you meet the Coordinator (University of Copenhagen) and one of the industry partners (A4F from Portugal).



Kick-off meeting in Copenhagen – 1st training event

We have so far had two very successful training events. The first was our Kick-off meeting held at University of Copenhagen at the Department of Plant and Environmental Sciences in Denmark.

The training event '**Research Skills in Microalgae**' took place in Copenhagen from 1-3 May. It consisted of a series of talks by all the present participants including PIs and fellows and additional speakers from University of Copenhagen and the Technical University of Denmark. The PIs gave training lectures covering photosynthesis, metabolism, genetic manipulation and industrial bioreactors, and the fellows presented their background and their present projects. Furthermore, the three participant companies were responsible for an evening session discussion regarding which hopes and expectations the companies have for the outcome of the collaboration with the universities. You can download the program with a list of all the presentations on our website: <http://photocomm.ku.dk/trainingevents/kickoff/>



2nd training event in Freiburg

The second training event was held at University of Freiburg, Department of Biology 9-11 September. Main organizer was Prof. Wolfgang Hess.

The training event was within '**Bioinformatic analysis of transcriptomic and genomic datasets in metabolic context**' and combined lectures with hands-on training. The workshop introduced techniques and approaches that are used for modeling of biological systems, with an emphasis on analysis/interpretation of transcriptome and metagenome data. The fellows received direct training in the computational methods involved and the final part of the workshop included detailed discussions of the data generated and analysed during the project. You can download the program here:

http://photocomm.ku.dk/trainingevents/2013_bioinformatics/



Meet the PIs from University of Copenhagen

The Section for Molecular Plant Biology

(http://plen.ku.dk/english/research/molecular_plant_biology/) focuses on increasing plant productivity through application of molecular biology and has interests in various aspects of plant research. By combining basic and translational research activities, the researcher here aim at making contribution to some of the societal challenges such as increasing primary productivity for meeting demands for food and biomass for bioenergy and generating novel cell factories ("green factory") to produce valuable commodities and nutraceuticals.



Coordinator, Prof. Poul Erik Jensen

Poul Erik is Section Leader of Section for Molecular Plant Biology (and Vice-head of Copenhagen Plant Science Centre (<http://cpsc.ku.dk/>)). His main focus is photosynthesis and his research projects include engineering microalgae, mosses and plant cells by re-routing biosynthetic pathways and optimizing the chain of energy transfer from the photosynthetic systems into production of desired bioactive natural products such as complex diterpenoids which have a wide range of valuable properties, e.g. anti-cancer

agents, hormonal regulators or antibacterial agents against multidrug-resistant bacteria.



Co-PI, Associate Prof. Yumiko Sakuragi

Yumiko's research aims at obtaining holistic understanding of the production of complex carbohydrates and biomass in plants and cyanobacteria. Main theme is regulation. Yumiko is working towards understanding how cell wall biosynthesis is regulated through protein-protein interactions and how cell wall modifications impact the plant physiology and development. Furthermore,

using cyanobacteria as models she is investigating signaling cascades that regulate photosynthesis and cellular carbon allocation. In PHOTO.COMM, Yumiko and Erick (ESR) are devising new strategies to break microalgal cell walls for efficient recovery of products.

Meet the fellows at University of Copenhagen



Athur Wlodarczyk (ESR10) from Poland

Main Supervisor: Prof. Poul Erik Jensen

Arthur started his PhD the 1st of May 2013 and the title of his project is " *Redirection of electron towards P450 enzymes.*"

He has done his masters in Spain studying genotypic and environmental effects on the organoleptic quality of tomato paste varieties. After his masters he has been employed as a research assistant at Centre of Molecular and Macromolecular Studies at the Polish Academy of Sciences working with expression of

recombinant proteins in *E. coli* and tRNA damages during oxidative stress. His hobbies include mountain hiking, travelling, photography and architecture.



Erick Ramos Martinez (ESR11) from Mexico

Main Supervisor: Associate Prof. Yumiko Sakuragi

Erick started his PhD the 5th of August 2013 with the title "Inducible cell lysis system and cell wall characterization for enhance product recovery from microalgae". He has a master's degree in Synthetic Biology from the University College London, his master thesis focused on engineering *E. coli* with a synthetic genetic network for bioprocess control. Erick has also been a research assistant both at the International Maize and Wheat Improvement Center (CIMMYT) and

later at LABCITEC SA, where he was working on engineering the PEG biosynthetic pathway in *E. coli*. In his spare time Erick likes cooking & baking, travelling, camping and volleyball.

A4F – one of our industrial partners, placed in Portugal

A4F, AlgaFuel, is a spin-out company from Necton S.A., dedicated to the development and implementation of microalgae production units for the production of fuel, food, feed, fibers and fertilizers.

AlgaFuel has more than 12 years experience and has the largest outdoor photobioreactor in operation in Europe since 2009.



PI, Chief Development Officer, Dr. Vitor Verdelho Vieira

Vitor has a background in Physics from the Sciences Faculty at the University of Porto, and has worked in biotechnology projects for more than 20 years. His first biotech business started in 1989 with Necton S.A. This is a marine biotechnology company doing commercial production and sale of microalgae since 1997 for aquaculture and cosmetics. The production system was initially based in raceways and then moved into several types of photobioreactors,

growing both marine and freshwater species. Vitor has been involved in 11 European and around 50 National research projects under different frameworks and programs.



Tiago Guerra (ER2) from Portugal

Main Supervisor: Dr. Vitor Verdelho Vieira
Tiago is one of the two Postdocs or Experienced Researchers (ER) in PHOTO.COMM. He is from Portugal himself but has been away so long that he was eligible for the position here. His project has the title "*Mixotrophic cultivation of microalgae*". After his Master, which was done at Molecular and Cellular Biology from School of Sciences University of Lisbon, he has done his PhD in Chemistry in USA. This was at Princeton University, where the title of his thesis was

"Control of Photosynthetic carbon allocation between proteins, lipids and carbohydrates in cyanobacteria and diatoms and its implications for biofuel production". His hobbies include scuba diving and other sports.

Looking ahead

Summer School and Midterm Review in Lisbon, May 2014

The next training event will be a Summer School on **Industrial Microalgae Systems**. The training event is organized by our three industrial partners A4F, NOVAgreen and AlgaeBiotech, of which A4F is the main organizer. At the Summer School the fellows will get in-depth knowledge of a working algal production. See more here: <http://photocomm.ku.dk/trainingevents/>

The Summer School will be combined with Supervisory Board meeting, progress meetings and the Midterm Review with REA. For these meetings our Advisory Board will also be present, which consists of Dr. Oliver Ebenhoeh from another ITN, AccliPhot, (<http://www.accliphot.eu/people/ebenhoeh>) and Maria Barbosa: <http://www.wageningenur.nl/en/Persons/MJ-Maria-Barbosa-PhD-MSc.htm> .

Training event in London, Sep 2014

This training event in “**From Idea to Business**” is mainly organized by Dr. Patrik Jones, Imperial College London. Under this event the fellows will develop and evaluate a business case which is elaborated on in teams and under expert coaching. A draft for the event includes

- Idea creation and evaluation
- From idea to business case, research and evaluation
- The next steps, needs and requirements to implementation
- Experience from aquatic biotechnology, particular challenges
- Basic crash course in intellectual property rights of relevance for biotechnology,

