Meet Dr Dimitra Georgiadou

Dimitra obtained a Master's Degree in Advanced Materials Science from the Technical University of Munich, Ludwig-Maximilians University of Munich and the University of Augsburg. She then continued on with a PhD in Photochemistry/ Organic Electronics from the National Technical University of Athens. Dimitra is currently working on the PLANALITH project under the supervision of Professor Thomas Anthopoulos in the Experimental Solid State Physics group at the Blackett Laboratory, Imperial College London.

Dimitra's research interests range from the photochemical tuning of emission colour of fluorescent and phosphorescent emitters for application in PLEDs to the study of different organic and inorganic materials that can be used as interfacial layers in PLEDs and organic photovoltaics, whereas she has also performed synthesis of mesoporous nanocrystalline TiO2 for application in dye sensitized solar cells. She is co-author of over 35 publications in peer-reviewed journals. Dimitra has also gained industrial experience through internships at Procter & Gamble, Italy, and Schreiner Group, Germany.

I have been working on the PLANALITH project since March 2015. Within these first months I have already been given numerous opportunities to both make significant advancements in my project's objectives, as well as develop my personal skill set.

PLANALITH is about adhesion lithography, a novel patterning technique allowing the simple but not simplistic and yet efficient, high-yield manufacturing of large aspect ratio (>100,000) metal electrode nanogaps. This innovative method of depositing two different metals at distances shorter than 50 nm from each other, if combined with the proper active materials selection, may give rise to a plethora of nanoscale optoelectronic devices, such as rectifying diodes, ultra-fast photodetectors and bright nano-LEDs, just to name a few, that will pave the way for the electronic devices of the future.

My major responsibility within this project is to develop a semi-automated system that will control the key step of the nanogap formation, namely the peel-off of the adhesive material (i.e. glue or adhesive tape) from the metal surface, which will ultimately determine the quality of the nanogap. Apart from this purely engineering task, my research is focused on the development of rectifying diodes showing high-frequency (>13.57 MHz) rectification, rendering such devices extremely attractive for wireless near-field communication (NFC) applications spanning from RFID tags to Bluetooth.

What I particularly like about this project is that it allows me to envisage the shape of things to come (e.g. Internet of Things) and I can have a piece of the action through my current work. I truly enjoy working at the interface of fundamental research, including the astute selection of functional materials and formation of high-performing devices at the nanogaps, and industrial exploitation en route from validation in the lab to demonstration of proof-of-concept in an industrially relevant environment. It is exciting to think that what started as a "fiddling-around" with various tapes available in the lab will evolve into a PC-controlled system that will be able to fabricate nanogap structures with high throughput in a fully controllable and optimised way.

From a more subjective perspective, I find it extremely motivating to work in a multidisciplinary group, to be granted access to the state-of-the-art facilities and equipment of Imperial College, to have a sum of financial resources at my disposal thanks to the EPSRC grant and, most importantly, to experience excellent communication with my colleagues and my supervisor. I also find the engagement of Dr Philip Cooper, who has vast industry experience, with our team highly valuable. Phil has been able to closely follow the progress of the project and provide us with feedback and advice with regard to the potential future uptake of this technology by a UK electronics manufacturing industry.

My goals for the next months are to continue performing top-notch research, networking with academic and industrial partners, sharpening of skills such as project management and supervision of students' projects, and widening of my scientific knowledge and technical competences. And last but not least, peeling-off the nanogap is always great fun!