

JSPS London Report: Amanda Hüsler

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Field: Microparticle formation using microfluidics for regenerative medicine

Current Institution: University of Nottingham (School of Pharmacy, Additive Manufacturing and 3D Printing Research Group)

Host Institution: Tokyo Institute of Technology

Host Department: Precision and Intelligence Laboratory

Host Researcher: Professor Takeshi Hatsuzawa

Period of stay in Japan: 01. November 2015 – 31. January 2016 (3 months)

Research summary:

The pre-doctoral short-term fellowship gave me the opportunity to perform exciting research work in Professor Hatsuzawa's group located at Suzukakedai campus of Tokyo Institute of Technology. Besides gaining insight into Japanese research I also experienced Japanese culture on a daily basis. I applied only for 3 months but those months were quite demanding.

The research that I undertook in my fellowship and in my current PhD is focusing on optimising fabrication methodologies of a cell carrier system applied in regenerative medicines strategies. During my PhD, uniform microspheres have been fabricated using photocrosslinkable macromers in a combination with piezoelectric inkjet printing. In Japan however, I had the opportunity to gain technical skills and knowledge in microfluidic-based technique, which is an alternative manufacturing process to 3D printing and is generally considered, amongst many researchers, as a viable method to prepare pharmaceutical delivery vehicles. The materials chosen for my short-term visit was a small selection of macromers out of my particle library generated with piezoelectric inkjet printing. Monodisperse microparticles were produced applying suitable planar microfluidic geometries. Homopolymeric and copolymerised blended-before microspheres were generated with a simple T-junction. In order to fabricate copolymerised on-chip particles, meaning that the two different monomers were only mixed in the glass chip, a Y shaped channel leading to a T-junction was used. The findings of this research have shown that the microfluidic throughput is orders of magnitude higher than the one of piezoelectric inkjet printing. The effect of this range of particle chemistry on cellular attachment and control of cell phenotype are under investigation for both fabrication techniques in order to be able to compare and contrast.

Prof. Hatsuzawa and Assistant Prof. Nisisako supported my research since the very first day. Assistant Prof. Nisisako was always open to discuss results and provided me with useful suggestions. I would say that the work outcome was great considering the short time we had available and that is mostly due to learning from Dr. Nisisako's expertise.

During my stay in Japan I visited a few places such as Yokohama, Tokyo and Kyoto. The landscapes were beautiful and it was wonderful to see a blue sky most of the days even though it was winter. The large selection of national dishes was fantastic and always freshly prepared.

To sum up, Japanese people show a great hospitality and often offer generous support in any situation. I would recommend though, to learn basic Japanese language skills since English, especially spoken English, is not that common in Japan as probably most of the people would have thought.



Group picture on my farewell dinner 2016



Yokohama 2015