

## Faculty Exchange Program – Final Report

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**Host:** Krzysztof Matyjaszewski, J.C. Warner University Professor of Natural Sciences, Department of Chemistry, Carnegie Mellon University

**Period of visit:** April 2016 to August 2016

This short report intends to summarize the activities developed and the experience acquired during my stay at CMU under the scope of the Faculty Exchange Program. As a general comment, I can easily state that my biggest expectations were completely exceeded. During this 4 month experience in a so enriching, dynamic and vibrant environment, I developed very important skills that certainly will be extremely useful for my future activities at the University of Coimbra.

I had the opportunity to attend several seminars, workshops and PhD thesis defenses. I also have discussed strategies to better teach undergraduate and graduate students, which was important to understand how courses are organized at CMU. The importance of self-study outside the classes and the use of tools that could allow a better vision of the topics (e.g practical experiments, videos) is decisive to call the attention of the students and motivate them to learn. I gave a seminar about my research activities entitled “Synthesis and Application of Innovative Polymers: - Fundamental and Applied Research”.

Regarding research activities, I was fully integrated in the Prof Matyjaszewski's research group. Besides the weekly meetings I also attended to other small group meetings organized based on main research areas of the group (e.g mechanisms, hybrids, etc). This experience was very enriching because it allowed me to understand how a top research group is organized to address front-line research questions. I have worked on mechanistic understanding of the SARA-ATRP method. One paper was submitted during my stay that resulted from the work that has been carried out by a PhD student at CMU that is co-supervised by me and Prof. Matyjaszewski. Three more papers are being prepared and will be submitted in a near future. Two address important questions regarding the mechanistic understanding of SARA-ATRP in water/alcohol mixtures and pure aqueous media, and the third is a review paper on gene delivery. I have discussed the workplan for some on-going collaborative projects with Prof. Matyjaszewski in the area of antimicrobial polymers and gene delivery.

Based on our fruitful discussions, three different projects were submitted in collaboration in the scope of the last call of FCT for PhD and Postdoctoral fellowships. The areas involved include metal-free ATRP, new tailor made polymers for Dye Sensitized Solar Cells and conductive polymers. Under the scope of on-going financed project on the area of stretchable conductive sensors that involves different partners including the Mechanical Engineering Department of CMU, I had the opportunity to visit Prof Carmel Majidi. I have visited his laboratories where part of the project will be done and I have attended to two seminars. The scientific discussions were very important for the project and I had the chance to have a more integrated vision of the project by having a close understanding of the technology that will be used at CMU. The work done at CMU will allow me to strengthen even more the on-going collaborations with CMU, providing me the opportunity to learn with top researchers.

Finally, I have prepared a database of most relevant materials/products that have been developed regarding new advanced polymers prepared by ATRP methods. This information will be soon disseminated in the website of my research group ([www.polysyc.pt/newATRP](http://www.polysyc.pt/newATRP)).

After this amazing experience, I will focus my attention on the coming months to implement what I have learned in my teaching and research activities. I consider that the objectives foreseen for this short visit were completely accomplished and this experience will have a decisive impact on my future professional career.

Without the help and support of different people, my stay at CMU would not be possible. Firstly, I would like to express my deepest gratitude and recognition to Prof. Matyjaszewski. I am profoundly in debt with him for the amazing conditions that he provided me. Indeed, while in Pittsburgh I was always treated as family member. He gave me the wonderful opportunity to actively participate in the research activities of his world recognized research group. I would like to thank James Spanswick who shared the office with me, for his help and our talks. Many thanks to the members of research group that for their sympathy and for being always ready to help. A particular thanks to Pawel Krysz and Marco Fantin with whom I have interacted more during my stay. I would like to thank CMU-Portugal faculty exchange program and FCT for supporting this wonderful experience that has helped to growth at the personal and scientific level.

Last but not least, to my family for their full support to my decision to embark in this journey, specially my wife and son, which are the reason why everything makes sense, and in spite of the long distance they were always very close to me.

Jorge Fernando Jordão Coelho