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**Report of scientific activity
by Giuseppe Pontrelli
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Advancing the design of next generation medical implants

During the week I visited the Department of Biomedical Engineering of University of Glasgow, hosted by Dr. Sean McGinty. I had a number of useful discussions with him and with Dr. Martin Meere (Ireland) concerning plans for future joint research in the field of drug delivery from medical implants. After reading some experimental papers and other relevant literature on the topic, we agree on using a dual-drug mathematical modelling, but we realized that the classical diffusion theory is incapable of describing interacting non-dilute species in drug-eluting platforms. Actually, in many cases the assumption of dilute concentration does not hold, requiring the development of more sophisticated multicomponent non-Fickian diffusion models. One of the themes we planned for next research is to formulate novel multicomponent diffusion models for drug release systems. In particular, we formulate the need to study the drug diffusion problem from a polymeric matrix loaded with a drug or with a mixture of drugs, to have a beneficial therapeutical effect.

On one day I visited the Strathclyde University and I participated to a meeting there. I had interesting and informative talks with Prof Sean McKee (Department of Mathematics and Statistics) and with Dr Chris McCormick who leads experiments in drug release. I also met a leading cardiologist and orthopaedic surgeon to hear first-hand about the need for better controlled (possibly dual-drug loaded) medical implants. During these days, I have gained a really good insight of the experimental capabilities to the laboratories over there.

I found the visit of Glasgow University very fruitful and productive for my research work: we set up a preliminary program and planned experiments on the future joint research for the following months. Following these meetings and thanks to the discussion with above persons, a couple of scientific publications are expected to be completed by the end of 2017.

Yours faithfully .

Giuseppe Pontrelli

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