



# School of Pharmacy PhD Projects 2015/16

**Project Title**      **Drug binding in addition-cure silicone elastomers**

**Supervisors**        Prof. Karl Malcolm and Dr. Peter Boyd

**Description**        Silicone elastomers are well-established biomaterials that have been used in a number of controlled drug delivery applications. 'Addition-cure' silicone elastomers are particularly common, and are prepared via a rapid and simple hydrosilylation reaction between vinyl ( $-\text{CH}=\text{CH}_2$ ) and silane groups ( $-\text{Si}-\text{H}$ ). It has been known for some time that drugs containing certain chemical functional groups can inhibit this hydrosilylation curing reaction. Recently, we have also shown that certain drug molecules can chemically bond with the silicone elastomer, such that they are no longer capable of being released from the drug delivery device. In this three-year basic research project, the mechanism of drug binding will be investigated (using various analytical techniques, including Raman microscopy, rheology, NMR, IR, in vitro drug release testing, etc) and various strategies developed to overcome the drug binding. For example, drug particle size and drug solubility in the silicone elastomer are known to dramatically influence the extent of drug binding. Strategies aimed at optimising drug particle size and/or minimizing solubility in the elastomer will therefore be explored. The data obtained during the project will be critical to understanding and optimising drug release from silicone elastomer materials. The successful student will be working as an integral part of a larger, internationally leading research team.

**Start Date**            September / October 2015

**Keywords**            drug delivery, controlled drug release, silicone elastomer, drug binding,

#### Contact Details

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#### How to Apply

Postgraduate applications should be made using Queen's Online:

<http://go.qub.ac.uk/pgapply>

Please note that there are two application processes: one for admission to the university and another for postgraduate awards.

#### Further Information

Additional information for prospective postgraduate students can be found on the School of Pharmacy website:

<http://www.qub.ac.uk/pha>

and the Queen's Postgraduate website:

<http://www.qub.ac.uk/home/ProspectiveStudents/PostgraduateStudents/>

