Title: Stimuli-responsive biomaterials for controlled/triggered/sustained delivery of drugs or biologics.

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Introduction: Stimuli-responsive materials (SRMs) have significant potential for the development of systems capable of the controlled, triggered or sustained delivery of drugs or biologics. Our interest is in the design, synthesis, and characterization of a range of materials capable of responding to one or more stimuli [1-6], particularly when sensors are integrated in such devices [7,8].

Methods: An interdisciplinary approach combining chemistry (polymer synthesis) and materials science and engineering was employed to prepare and characterize SRMs via electrochemistry, microscopy and spectroscopy. SRMs loaded with drugs or biologics were exposed to stimuli, and the release of the drugs or biologics was quantified spectroscopically.

Results: Electricity, light and magnetism are capable of triggering the delivery of drugs or biologics of various molecular weights from these SRMs *in-vitro*.

Conclusion/Implications: SRMs can deliver a variety of clinically relevant drugs or biologics of various molecular weights in a controlled, triggered or sustained fashion over extended periods, and can potentially be used to control the chronopharmacology of the drugs or biologics in line with the chronobiology of the condition needing treatment.

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References: 1) *Pharmaceutics*2020, 12, 8, 742. **2)** *Polymer International*, 2020. DOI: 10.1002/pi.6089. **3)** *Macromolecular Materials and Engineering*, 2020, 305, 6, 2000130. **4)** *ACS Omega*, 2020, 5, 3, 1549-1556. **5)** Analyst, 2021, 146, 9, 2784-2806.

Presenter Biography: J.G.H. a Senior Lecturer (Associate Professor) in materials chemistry working at the interface of biomedical engineering, materials science and pharmacy, leading an impact-focused team developing SRMs for various medical applications.

Learning outcomes:

- Understand the structure and properties of SRMs, and how to analyze and apply them.
- Understand how stimuli can be utilised for specific applications in biomedical engineering, exemplified by the controlled, triggered or sustained delivery of drugs or biologics.
- Evaluate how drugs or biologics can be formulated with such SRMs and be able to design delivery systems exploiting these principles.