The London Materials Society presents:

The 2021 Larry Hench Lecture and the June Wilson Award

Thursday 4th November, 6:00 pm - 9:00 pm, Pippard Lecture Theatre, Imperial College London, Sherfield Building, South Kensington, London SW7 2AZ **(also available on ZOOM)**

Doors open 6:00 pm, talks begin 6:30 pm, refreshments provided afterwards.

Registration required: https://www.eventbrite.co.uk/e/designing-biomaterials-for-tissue-repair-and-disease-modelling-tickets-195074993557?aff=Flyer

2021 Larry Hench Lecture: Designing biomaterials for tissue repair and disease modelling

Eileen Gentleman, PhD
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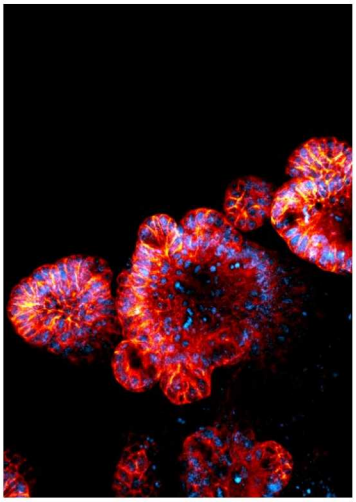

Pathological matrix remodelling plays a central role in many human diseases, but is challenging to study as in vitro models often cannot replicate the complex 3D cell-matrix interactions that drive pathologies. In this lecture, I will discuss how we used biomaterials to build a 3D model of the human gut that allowed us to uncover an unexpected role for a rare immune cell type called ILC1 in driving gut fibrosis in patients with Crohn's disease. We used molecular dynamics simulations to design PEG-based hydrogels that cross-link quickly, but can still mimic the stiffness of normal intestinal tissue. We then co-cultured encapsulated human intestinal organoids with ILC1, and using a combination of atomic force microscopy force spectroscopy and multiple particle tracking microrheology, found that ILC1 drive intestinal matrix remodelling through a balance of MMP9-mediated matrix degradation and TGFβ1-driven fibronectin deposition. Our findings demonstrate the potential of using biomaterials in disease modelling, and open the possibility of unravelling how pathological matrix remodelling contributes to disease.

2021 June Wilson Award: Inorganic nanoparticles for Tuberculous Meningitis treatment

Dr Alessandra Pinna
Imperial College Research Fellow, Department of Materials, Imperial College London

Tuberculous Meningitis (TBM) is the most severe form of tuberculosis infection, resulting in M.tb bacteria invasion across the blood brain barrier (BBB), which triggers an inflammatory cascade in the brain. Worldwide 100,000 individuals develop TBM each year and 150-200 cases are reported in the UK. Mortality is high, 60% in HIV-infected adults and 20% of treated children will die, and 30% will suffer long-term after-effects. After-effects include severe brain damage, epilepsy, paralysis, and hearing loss, so TBM survivors require extensive support from medical staff. TBM treatment is currently based on IV injection of treatment of pulmonary tuberculosis (TB) with combinations of intravenous antibiotics. Therapy using these drugs has poor outcomes because suboptimal drug levels reach the cerebrospinal fluid due to poor BBB penetration. There are also issues with lack of patient compliance to administer injectable drugs with undesirable side effects and the growing problem of multi-drug resistance. Moreover, immunoinflammatory damage is a critical pathological process in TBM and anti-inflammatory drugs such as corticosteroids, dexamethasone or aspirin are in trials, but evidence is lacking about whether they cause disabilities or side effects. Treatment of TBM using alternative vehicles to deliver antibiotics inside the brain and alternative adjuvant anti-inflammatory drugs is an urgent clinical need. Engineered inorganic NPs such as mesoporous silica NPs and nanoceria are promising candidates for the treatment of TBM. These nanomaterials are sufficiently small to circulate systemically and cross the BBB, but can be designed with a large internal pore volume to deliver significant antibiotics and antiinflammatory drugs to the TBM cells; their size, surface chemistry and shape can be tailored to select specific transport mechanisms across the BBB and avoid clearance.

2022 June Wilson Award: Applications Open

The London Materials Society invites applications for the 2022 June Wilson Award. This award is an endowment from the late Prof. Hench (1938-2015) in commemoration of his late wife's achievements in the field of materials research and was re-inaugurated in 2017. The prize of £750 is intended to offer support to London-based female students and early career researchers, contributing towards:
1) Postgraduate students/early-career scientists: Costs related to research and careers (for example lab consumables, childcare and/or travels), or
2) Undergraduate students: A stipend for an undergraduate summer project.
Early career women (including students) interested in competing for the Award should submit their name and affiliation(s), a brief CV with publications list and an abstract of no more than 500 words describing their current and proposed future research, as well as details of why this Award is required by the student/scientist and how the prize would support and impact their work to info.lms.iom3@gmail.com, no later than **Monday 31st January 2022**