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## Bio-based and Bio-inspired [nano]Technologies: The laboratory, and the field

*Tuesday, 26 June 2018 14:00 (1 hour)*

Development and application of bio-based and bio-inspired technologies to (i) screen for, identify and quantify molecules of interest; (ii) profile and characterize molecular activities/events; and (iii) help elucidate pathophysiological mechanisms is a major field with applications in various sectors including biomedical, environmental, energy, food and agriculture. With students and researchers of Applied Physics in mind, we will highlight the fundamental chemical principles intrinsic in biological and biophysical interactions and their exploitation in development of the technologies. Concrete examples will be discussed, and relations to applied physics drawn. We will focus on the development and application of Biosensors, a bio-based technology; and biomimicry membranes, a bio-inspired technology. These interactions are largely driven by natural affinities between biological molecules such as substrate-enzyme, antibody-antigen, receptor-ligand, and Watson-Crick base-pairing. Advances in science and technology have allowed the inclusion of artificially synthesised molecules that mimic biomolecules of interest, such as peptide nucleic acid (PNA). Biomimicry membranes are cell-sized, lipid vesicles that mimic the biological cell. Since the relative compositions of lipid mixtures used influence molecular self-organization and vesicle properties, preparation for tailored application is possible. Thus, biomimetic membranes enable a researcher to manipulate a 'biological' micro-vesicle under a controlled environment. We will conclude by discussing the challenges in design, development and application at point of use. The latter remains one of the biggest challenges in realizing the potential of bio-based and bio-inspired [nano]technologies.

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