Biomaterial Interfaces
Room 311a - Session BI2-ThM

Sugars at Surfaces
Moderator: G.P. Lopez, University of New Mexico

10:20am **BI2-ThM7 Chemical Glycomics: Carbohydrates on Surfaces to Screen Biopolymer Interactions**, ***P.H. Seeberger,*** ETH Zurich, Switzerland **INVITED**

The growing field of glycomics is suffering from the lack of molecular tools for screening, imaging, purification and other procedures that are routine in studies involving peptides and oligonucleotides. Using an automated oligosaccharide synthesizer we developed some time ago, access to defined oligosaccharides has become very rapid. These synthetic molecules, as well as any isolated carbohydrate, can now be readily converted into a series of tools that aid biological and medical investigations. Described are: 1) Carbohydrate microarrays that require small quantities of material, are fully amenable to HTS technologies to screen carbohydrate interactions with proteins, DNA, and carbohydrates as well as cells; 2) Affinity colums, magnetic beads and carbohydrates containing biotin are used to isolate proteins interacting with oligosaccharides and glycoconjugates; 3) Carbohydrates equiped with fluorescent tags or quantum dots is used to image carbohydrates in vitro and in vivo. Application of these tools to biological problems of medical significance will be discussed. Particular emphasis will be placed on novel aminoglycoside antibiotics, HIV glycobiology and the development of fully synthetic carbohydrate vaccines.

11:00am **BI2-ThM9 Synthetic Glycopolymers as Scaffolds to Study Multivalent Carbohydrate Interaction at Surfaces**, ***G. Coullerez,*** *K. Barth, M. Textor,* Laboratory for Surface Science and Technology, Switzerland

Carbohydrates are information-rich molecules vital in intercellular interactions. As cell surface receptors, they play a role as recognition site for interactions with other cells, viruses or bacteria. To investigate those bio-interactions sugar tools based on carbohydrate chemistry and sensitive analytical techniques are needed. Functionalized surfaces with synthetic carbohydrate-tagged polymers that display multiple copies of the binding sugar units are attractive approaches to mimic interaction at cell-surfaces. They are often multivalent providing strength and specificity. In this aim, we have developed PEG-graft polycationic copolymers tagged saccharides. While spontaneously adsorbed on negatively charged surfaces the copolymers show specific lectin and bacteria recognition. Combined with a photolithography patterning method on metal oxide surfaces (Nb@sub 2@O@sub 5@, TiO@sub 2@), the high specificity of this platform in a non-fouling background is also demonstrated. The glycopolymers can also be synthesized with atom transfer radical polymerization (ATRP) of glycosylated monomers, featuring a wide range of functionalities, molecular weight and polydispersity for specific protein or cell-targeting applications. To demonstrate the versatility of our approaches, we use in particular the well-known mannose-lectin Concanavalin A (ConA) or bacteria E. Coli specific interactions. To sense in situ/in real time and quantitatively the interfacial processes between carbohydrate-modified surfaces and proteins in solution, fluorescence microscopy and optical evanescent field based sensor are used. The carbohydrate surface density is also quantitatively investigated by chemical surface analysis methods (XPS, ToF-SIMS). First applications and case studies using synthetic glycopolymers tagged with mono- or oligosaccharide will be discussed mainly in the context carbohydrate chips for proteins and pathogens detection and delivery vectors to target specific cell receptors.

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