MASTER PROJECTS AVAILABLE <u>IMMEDIATELY</u> AT DTU CHEMISTRY AND BIOENGINEERING DEPARTMENTS

Glycocalyxification – The ultimate chemical Plug'N-play toolbox to understand cellular interactions

Every living cell is covered by the glycocalyx, a complex and dynamic carbohydrate network responsible for cell adhesion, endocytosis and many interactions at the cell surface. However, numerous parasites, viruses and, bacteria also exploit these mechanisms to colonize tissues and enter cells. To sort out the complexity and diversity of host-pathogen interactions occurring at the surface of living cells, our lab develop chemical and dynamic tools to decipher these interactions. Specifically we are developing 'modules' that spontaneously integrate into the lipid-bilayer cell membrane when added to the cell suspension or immobilized cells. The modules are designed to accommodate different functionalities to study the interaction of interest such as glycans, peptides, proteins or antibodies (nanobodies). Same time the modules are equipped with different reporter molecules (e.g. fluorophores, biotin) for easy detection and quantification.



Figure 1. Synthetic glyco-peptide-lipid module and preliminary assembly and detection on GUV surface. A) a preliminary module consisting of 1 or 2 cholesterol moieties and O-GalNAc monosaccharide (blue square, X = natural O-glycan linkage) displayed on an amphiphilic peptide linked to a modamine fluorophore were assembled onto GUVs; B (panel a) detection of membrane component BODIPY, B (panel b) modamine detection of incorporated module and B (panel e) detection of FITC-labeled VVL lectin causing agglutination of GUVs.

You will be involved in organic synthesis of modules and exposed to different purification and analytical technologies. You will also have the opportunity to investigate your obtained module in a biological setting including biochemical and cellular assays as well as fluorescence- and/or scanning electron microscopy (SEM).

We are seeking hard working and curious students interested to learn more about chemical biology and engage in further development of the technology briefly described here. We would like you to have some background in chemistry, e.g. courses 26002/26003/26004, 26407, 26422, 26428 and/or 26433, 26444, 26438, 26416 and 26422

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