



GESELLSCHAFT DEUTSCHER CHEMIKER

Ortsverband Osnabrück

“Superselectivity and receptor recruitment as organizing principles in bio-sensing and self-assembly”

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Multivalent interactions govern biological processes like cell signaling and virus infections. Such interactions are characterized by unique energetic, structural and dynamic properties, and they occur at a well-defined contact area, in which multiple complementary binding sites interact with each other in a reversible and dynamic manner. Emerging properties of such systems are superselectivity and recruitment. Superselectivity describes the nonlinear dependence of binding with receptor/ligand densities, whereas recruitment occurs when mobility allows receptor and/or ligand sites to move in and out of the contact area, typically leading to enhanced binding sites occurring within the contact area and depletion thereof outside. The present report shows how superselectivity and recruitment can be engineered to create new principles for biomarker isolation and for materials self-assembly, respectively.

In the first example, superselectivity is employed to up-concentrate the cancer biomarker hypermethylated DNA (hmDNA). Surfaces with controlled densities of a methyl-binding domain (MBD) protein show enhanced affinity for DNA with increasing numbers of methylation sites. This allows implementation into a microfluidic device in which hmDNA can be effectively isolated from liquid biopsies to allow highly sensitive detection.

In the second example, recruitment is shown to provide stoichiometrically controlled assemblies of vesicles decorated with complementary receptor and ligand sites implemented in their membranes. The affinity between the vesicles shows signs of superselectivity while receptor/ligand recruitment controls the binding stoichiometry of the vesicles. Fluorescence resonance energy transfer (FRET) of dyes incorporated within the vesicle membranes allows detailed analysis of the contact area between them. Overall, these examples underline the powerful paradigm of multivalent interactions and their functional properties.

Der Vortrag findet am **Di, 21.11.2023, 17:00 Uhr s.t.** im CellNanOs statt:
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Besucher sind herzlich willkommen!

Der Ortsverbandsvorsitzende:

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