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## Polymer membranes decorated with biomolecules: Novel systems with medical potential

Cornelia G Palivan

University of Basel, Switzerland

Modern medicine is focusing on the development of new concepts that combine multifunctional compounds with stable, safe carriers or membranes in patient-oriented diagnostics or therapeutic strategies. Suitable amphiphilic block copolymers can self-assemble into 3D supramolecular assemblies, such as compartments with sizes in the nanometer range, or membranes mimicking biological membranes. Compared to conventional, low molar mass building blocks (e.g. lipids), membranes based on macromolecular self-assembly have advantages of superior stability, robustness, and possibility to tailor their physical, chemical, and biological properties. Here, we present protein-decorated membranes as selective permeable walls of compartments or as bilayers on solid support that provide distinct spaces for desired reactions at the nanometer scale. Biopores and channel proteins inserted into the polymer membrane of compartments selectively control the exchange of substrates and products with the environment. In this way they support an in situ activity of the encapsulated enzymes, and therefore the development of artificial organelles mimicking natural organelles, upon up-take in cells. Biopores and membrane proteins inserted in solid supported polymer membranes serve to mediate a transport of ions/molecules through the membrane, and therefore to induce biofunctionality. The encapsulation and/or insertion of active molecules (enzymes, proteins, mimics) in polymers compartments and membranes provide functionality to the hybrid materials, while the synthetic membranes support their stability and robustness, as essential factors for applications. The properties of such membranes can be extensively controlled via chemical composition, molecular weight and the hydrophilic-to-hydrophobic block length ratio of the polymers. These nanoscience based concepts open new avenues in protein therapy (artificial organelles) as well as sensing approaches (active<sup>2</sup> surfaces).

### Biography

Cornelia G Palivan obtained both her BSc (1982) and MSc (1983) degrees at the University of Bucharest. After 7 years at the Institute of Chemical & Pharmaceutical Research, Bucharest, as Project Leader in various drug research oriented projects, she took up a position as Teaching Assistant at the University of Bucharest. Between 1992-1994, she made the experimental part of her PhD under the supervision of Professor Michel Geoffroy at the University of Geneva where her long held interest in Electron Paramagnetic Resonance of metal complexes began. In 1995, she gained her PhD degrees with Summa cum Laude at the University of Bucharest, under the supervision of Professor Voicu Grecu. Two years later, she was appointed as a University Lecturer at Faculty of Physics, University of Bucharest. In 1999, she moved to the Department of Chemistry at the University of Basel where she was involved in projects using Electron Paramagnetic Resonance to characterise paramagnetic center in free radicals, metal complexes, and proteins.

Cornelia.Palivan@unibas.ch

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