

SCIENTIFIC AND METHOD MODULES

Module name	Hybrid systems
Number	2008-M09
Aims	Understanding the principles in preparation and application of hybrid systems, including immobilization of biomolecules and prerequisites for materials to attach biomolecules, as well as possible future application in biomedicine, biotechnology, and informatics.
Basics	(For topics marked with an asterisk an e-learning module shall be utilized, the others are covered by lectures from existing master courses): Chemical synthesis of peptides and carbohydrates, recombinant expression of proteins, protein folding, protein analysis, introduction into surface materials, principles of analysis of surfaces, basics in polymers/macromolecular science*
Contents	1. Protein expression by specific methods that allow modification and introduction of non proteinogenic amino acids, intein and impact system, modification of tRNA and genetic code expansion, selective chemical modification of proteins, pegylation of proteins, biocompatibility of materials, problems of toxicity and biodegradation. 2. Material aspects, including generation of polymers, surface modification, nanoscaffolds, preparation of building blocks, chemical modification of surfaces. 3. Preparation and analysis of hybrid compounds, ligation strategies, immobilization, application of hybrid materials in biomedical science, for biosensors, and for functional materials.
Methods	Techniques to obtain modified proteins, side chain protection strategies in peptide synthesis, cell-based assays to study toxicity, biostability and inflammation, analytics will include solid-state NMR.
Type	Two-day block course/ yearly recurrence with modification
Date (month/year)	11.- 12. February 2009
Time	9.00 – 18.00
Work load	15 hours presence/ 45 hours self-study
Examination	Written 17. 2. 09
Credit points	2
Responsible scientists	Beck-Sickinger,
International guest lecturers	Holland-Nell (Carlsberg Institute, Copenhagen), Scharnweber (TU Dresden), Leipzig University: Schulz-Siegmund, Huster, Hacker, Neundorf
Industrial partners	
Recommendations for literature, e-learning	Basics in biomolecules: structure of amino acids, nucleotides, carbohydrates

SCHEDULE for Module 2008-M09

Time	Lecturer	Programme	Location
February 11th, 2009			
9-10.30	Beck-Sickinger	Introduction into hybrid molecules	Brü34, kl HS
10.45-12.15	Neundorf	Synthesis strategies for modified peptides	Brü34, kl HS
<i>Lunch break</i>			
14.00-15.30	Holland-Nell	Chemical ligation for protein modification	Brü34, kl HS
15.45-17.15	Beck-Sickinger	Application of hybrid molecules	Brü34, kl HS
17.30		Lab Demonstration/peptide synthesis	
February 12th, 2009			
9-10.30	Hacker	Development and biomedical application of hybrid polymeric materials and devices	Brü34, kl HS
10.45-12.12	Schulz-Siegmund	Surface modification of polymeric biomaterials and their effects on cell-biomaterial interactions	Brü34, kl HS
<i>Lunch break</i>			
14.00-15.30	Scharnweber	Matrix based implant surface coating: synthesis and biological application	Brü34, kl HS
15.45-17.15	Huster	Analytical tools to study hybrid molecules, including solid state NMR	Brü34, kl HS
17.30		Lab Demonstration/NMR facilities	

Didactic elements:

Lecture, discussions, practical training – lab demonstration, etc.

Expected performance:

Active participation in discussions during lab demonstration etc.