Module name	**Smart molecules - Biomolecules**
Number	2010-M05
Aims	This module aims at linking molecular sciences, as well as topics from solid-state chemistry and physics, homogeneous, heterogeneous and bio-catalysis.
Basics	Quantum-electronic structures, transition metal complexes, organometallic compounds.
Contents	Specific synthesis, modification and understanding of the changes in the electronic structure of molecules that are precursors for materials with optimized catalytic activity and adjustable magnetic, electronic, and optical properties. 1. Small molecules: organometallic and transition metal complexes, building blocks for metal-organic frameworks (MOFs), immobilization of catalysts (on solid or in liquid supports), electronic structure of active units. **2. Designing and synthesising smart molecules that contain biological and chemical segments, strategies to introduce metals into biomolecules by selectively introduced chelators, monitoring structural changes.** 3. Clusters and polynuclear compounds: links between mononuclear complexes and the corresponding solid-state phase, homo- and heterometallic systems, metallated container molecules, supramolecular chemistry. 4. Supramolecular chemistry, molecular optical switches, self-assembly (concepts, strategies).
Methods	Synthesis of new building blocks, characterization of their electronic properties by molecular spectroscopy (IR, NMR, UV-Vis, etc.), structural changes due to interconnection.
Type	Two-day block course/ 6-7 May 2010
Work load	15 hours presence/ 45 hours self-study
Examination	Written ca. 1-2 weeks after the module – ca. 30-45 min
Credit points	2
Responsible scientists	Hey-Hawkins, Beck-Sickinger
International guest lecturers	Hans-Jürgen Pietzsch (Forschungszentrum Dresden-Rossendorf e.V.), Ulrich Schatzschneider (Ruhr-Universität Bochum), Anne-Marie Caminade (Laboratoire de Chimie de Coordination du CNRS, Toulouse, France), Goran Kaluderovic (Martin-Luther-Universität Halle-Wittenberg)
Industrial partners	Reinhard Paschke (Biozentrum der Martin-Luther-Universität Halle-Wittenberg and BioSolutions Halle GmbH)
Recommendations for literature	Basic textbooks for background in organometallic and bioinorganic chemistry: 1. C. Elschenbroich, Organometallics, 3rd edition, Wiley-VCH, Weinheim, 2006; chapters: carbonyl complexes, arene complexes 2. Bioinorganic Chemistry: A short course, 2nd edition, Rosette M. Roat-Malone, Wiley VCH, 2007 3. Concepts and Models in Bioinorganic Chemistry, ed. H.-B. Kraatz, N. Metzler-Nolte, Wiley VCH, 2006 Specific Textbooks: 1. Bioorganometallic Chemistry, ed. G. Jaouen, Wiley-VCH, **2006** 2. Metal Complexes in Cancer Chemotherapy, ed. B. K. Keppler, Wiley-VCH, **1993** References for synthesis of modified peptides: 1. I.U. Khan, A.G.Beck-Sickinger, Targeted tumor diagnosis and therapy with peptide hormones as radiopharmaceuticals. Anticancer Agents Med Chem. 2008, Feb;8(2):186-99. 2. B.T. Farrer, V.L. Pecoraro. Heavy-metal complexation by de novo peptide design. Curr Opin Drug Discov Devel. 2002 Nov;5(6):937-43

SCHEDULE for Module 2010-M05

Time	Lecturer	Programme	Location
May 6th, 2010			
9.00-10.30	Eva Hey-Hawkins	Basics in bioinorganic and bioorganometallic chemistry – Part I	Johannisallee 29 SR 102
10.30-11.00	*Coffee Break*		
11.00-12.30	Eva Hey-Hawkins	Basics in bioinorganic and bioorganometallic chemistry – Part II	Johannisallee 29 SR 102
12.30-13.30	*Lunch*		SR 153
13.30-15.00	Annette Beck-Sickinger	Introduction in the synthesis of modified peptides	Johannisallee 29 SR 102
15.00-15.30	*Coffee Break*		
15.30-17.00	Hans-Jürgen Pietzsch	Chemistry aspects related to labeling approaches with radiometals	Johannisallee 29 SR 102
19.00-….	*Dinner Bayerischer Bahnhof*		
May 7th 2010			
9.00-10.30	Ulrich Schatzschneider	Metal-carbonyl complexes and their bioconjugates for cancer chemotherapy and multimodal bioimaging	Johannisallee 29 SR 102
10.30-11.00	*Coffee Break*		
11.00-12.30	Anne-Marie Caminade	Dendrimers and their applications in cancer diagnosis and treatment	Johannisallee 29 SR 102
12.30-13.30	*Lunch*		SR 153
13.30-14.15	Reinhard Paschke	Magic bullets, bio-conjugates and drug shuttles – A short spproach to new developments in chemotherapy … or … Why is it so important to look over the fence	Johannisallee 29 SR 102
14.15-15.00	Goran Kaluderovic	Medicinal inorganic chemistry	Johannisallee 29 SR 102