UNIVERSITÄT PADERBORN
Die Universität der Informationsgesellschaft

FAKULTÄT FÜR NATURWISSEN-SCHAFTEN

UNIVERSITÄT PADERBORN | 33095 PADERBORN

Invitation / Einladung
Graduate Lectures on
Optoelectronics and Photonics

Wednesday, 4:15 p. m., Lecture Hall A1 (LV 061150)

Date	Fundamentals / Seminar (F / S)	Lecturer	Subject
28.08.13	S	Prof. H. Kikuchi, Kyushu University	Structure and Electro-optical Properties of Liquid Crystal Blue Phases
16.10.13	F(I.2)	Prof. Kitzerow	Colloidal crystals for photonics, liquid crystals and photonic crystals
23.10.13	S	Prof. H. Takezoe, Tokyo Institute of Technology	Azo dendrimer for device applications
30.10.13	F(I.2)	Prof. Huber	Colloidal crystals for photonics, liquid crystals and photonic crystals
06.11.13	S	Dr. D. Smalley, MIT	Integrated Acousto-Optic Leaky Mode Couplers for Holographic Video
13.11.13	F(I.2)	Prof. Greulich-Weber, Prof. Lindner	Colloidal crystals for photonics, liquid crystals and photonic crystals
20.11.13	S	Prof. W. Brütting, University of Augsburg	Optoelectronics with organic semiconductors
25.-26.11.	Colloquium of the Graduate Program		
27.11.13	F(I.2)	Prof. Greulich-Weber, Prof. Lindner	Colloidal crystals for photonics, liquid crystals and photonic crystals
04.12.13	F(II.2)	Prof. Noé	Foundations of classical and quantum optical communication
11.12.13	S	N. N.	
18.12.13	F(II.2)	Prof. Noé	Foundations of classical and quantum optical communication
08.01.14	S	Prof. M. Ballauff, Humboldt University Berlin	Hybrids of Polymer Colloids and Inorganic Nanoparticles – Synthesis, Characterization, and Application in Catalysis
15.01.14	F(II.2)	Prof. Silberhorn	Foundations of classical and quantum optical communication
22.01.14	S	Dr. Callsen, TU Berlin	Optical properties of single GaN/AlN quantum dots
29.01.14	F(II.2)	Prof. Silberhorn	Foundations of classical and quantum optical communication
05.02.14	S	Prof. Philip Russell, MPI Erlangen	Photonic Crystal Fibers

sgd. H. Kitzerow

Abstracts:

06 November 2013:

Integrated Acousto-Optic Leaky Mode Couplers for Holographic Video

Daniel Smalley

Leaky mode couplers have demonstrated several advantages over pixel-based devices (such as liquid crystal devices and micro-mirror arrays) when applied to holographic video. Some of these advantages include: lower fabrication complexity, polarization rotation, wide angular deflection and the possibility of frequency multiplexing of color. This presentation will describe the application of these devices to electroholography and give an overview of a standard resolution holographic monitor, now in development.

08 January 2014:

Hybrids of Polymer Colloids and Inorganic Nanoparticles – Synthesis, Characterization, and Application in Catalysis

M. Ballauff

Helmholtz-Zentrum Berlin GmbH, Hahn-Meitner-Platz 1, 14109 Berlin, Germany

and

HU Berlin, Institut für Physik, Newtonstraße 15, D-12489 Berlin, Germany

Metallic nanoparticles have been the object of intense research during recent years because of their catalytic activity. Applications in catalysis, however, require systems that act as carriers in order to prevent the coagulation of the particles. Moreover, active carriers may act as "nanoreactors" that allow us to tune the activity of nanoparticles. We have recently introduced spherical polyelectrolytes and core-shell microgels as such carriers. In my lecture I shall present at first our most recent work in this field, namely studies on the catalytic activity of nanoalloys bound to spherical polyelectrolyte brushes. Here nanoparticles are formed from two metals that may or may not be miscible in the bulk state. We have recently worked on nanoalloys formed from Au and Pt [1] and from Au and Pd [2]. The reduction of 4-nitrophenol by sodiumborohydride has been used as a model reaction. Nitrophenol is reduced to aminophenol without side reactions and the reaction takes only place in the presence of metallic nanoparticles [2,3]. A detailed analysis of the mechanism of this reaction could be developed by us. Moreover, we could demonstrate that Au/Pd nanoalloys are better catalysts than either Au- or Pd-nanoparticles indeed [2]. Possible reasons for this finding will be discussed together with an extensive characterization of these nanoalloys by EXAFS and high-resolution TEM.

In a second part I shall discuss hybrids consisting of metallic nanoparticles and colloidal microgels. Here I'll present our recent work on microgels used as "nanoreactors" that allow us to turn on and off the catalytic activity of nanoparticles to a certain extend [4]. In addition, the catalytic activity of nanoparticles enclosed in yolk-shell microgels will be shown [5]. These systems allow us to tune the catalytic activity of nanoparticles by simple external parameters as e.g. the temperature.

1. Schrinner, M.; Ballauff, M.; Talmon, Y.; Kauffmann, Y.; Thun, J. Möller, M.; Breu, J. *Science* **2009**, *323*, 617-620

2. Kaiser, J.; Leppert, L.; Welz, H.; Polzer, F.; Wunder, S.; Wanderka, N.; Albrecht, M.; Lunkenbein, T.; Breu, J.; Kümmel, S.; Lu, Y.; Ballauff, M., *Phys. Chem. Chem. Phys.* **2012**,*14*, 6487-649; Hervez, P.; Perez-Lorenzo, L.L.; Liz-Marzán, L.; Dzubiella, J.; Lu, Y.; Ballauff, M. *Chem. Soc. Rev*. **2012**, *41*, 5577-5587

3. Wunder, S., Lu, Y., Albrecht, M., Ballauff, M. *ACS Catalysis*, **2011**, *1*, 908-916.

4. Lu, Y.; Ballauff, M. *Prog. Polym. Sci*. **2011**, ***36***, 767-792

5. Wu, S.; Dzubiella, J.; Kaiser, J.; Drechsler, M.; Guo, X.; Ballauff, M.; Lu, Y. *Angew. Chem. Int. Ed*. **2012**, *51*, 2229-2233