Graduate School of Excellence MAINZ



Report of the 5th MATCOR Student Seminar

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The fifth MATCOR Student Seminar took place from Monday, January 18, 2010, to Wednesday, January 20, 2010 at the *Bistumshaus St. Ludwig* in Speyer. With 16 MAT-COR students attending the seminar it was going back to the roots after two seminars with other MAINZ and also external students. We welcomed one new MATCOR student, Leonie Mück, who started her PhD thesis in the group of Prof. Gauss at the beginning of January.

The seminar started off with a short introduction round, which was followed by a late afternoon scientific session. As the first speaker of the seminar **Kerstin Hild (Prof. Schönhense)** reported on *energy and angle dependent threshold photoemission magnetic circular dichroism (TPMCD) from an ultrathin Co/Pt(111) film*. TPMCD measurements for one and two photon photoemission were discussed. The second talk was given by



Figure 1: Participants of the 5th MATCOR student seminar *back row (from left to rigth)*: Tobias Eichhorn, Frank Reuter, Thomas Schladt, Simone Jäger, Christian Ludwig, Dominik Muth, Stefan Söffing. *middle row*: Mark Bahjors, Stephan Rix, Anne Pütz, Christina Schade, Tanja Graf, Kerstin Hild, Katja Medjanik. *front row*: Yuriy Khalavka, Eberhard Jakobi, Leonie Mück, Dima Kutnyakhov, Shahab Naghavi.





Dima Kutnyakhov (Prof. Schönhense), who spoke about *electrophysical and magnetoresistivity properties of granular multilayers based on Co, Ag, Au, and Cu.* Emphasis was laid on the correlation of granular nano-structures and the electrophysical and magnetoresistivity properties. Next, **Tobias Eichhorn (PD Jakob)** talked about *free-standing epitaxal films of the magnetic shape memory alloy Ni*₂*MnGa*, which are proposed to be used as compactly designed actuators and sensors. The session was concluded with a talk by **Tanja Graf (Prof. Felser)**, who reported on *structural and magnetic properties of the two phase quaternary Heusler alloy Co*₂*Mn*_(1-x)*Ti*_x*Sn*. Phase separation was shown to be useful tool for the improvement of thermoelectric properties of Heusler compounds.

Leonie Mück (Prof. Gauss) started off the Tuesday morning session raising the question: *What is the chemical bond?* The talk gave enlightening insight on the comprehension of the quantummechanical solution and its interpretation as chemical bonds. Then, **Stefan Söffing (Prof. Eggert)** reported on *confining potentials in the 1D Hubbard model*. The effect of different confining potentials on the solution of the 1D Hubbard model were discussed. As the third speaker, **Dominik Muth (Prof. Fleischhauer)** concluded the session with detailed insights on *local and non-local relaxatoin of a 1D Bose gas with finite interactions*.



Figure 2: The new MATCOR member Leonie Mück during her talk on chemical bonds.





After a short coffe break the third session was opened by **Yuriy Khalavka (Prof. Sönnichsen)** with a talk on *one-side growth of large plasmonic gold domains on CdS quantum rods observed on a single particle level* presenting a technique to grow gold nano particles on quantum rods. Next, **Thomas Schladt (Prof. Tremel)** spoke about *multifunctional monodisperse MnO nanocrystals as potential hybrid materials for biomedical applications*. He gave a broad overview over the material synthesis and its applications. Afterwards, **Christina Schade (Prof. Tremel)** gave insights on the *wet chemistry route towards nanostructures of thermoelectric antimonides*. A novel solution-based route to $Zn_{1+x}Sb$ nanophases for use as thermoelectric materials was presented.

On Tuesday afternoon **Eberhard Jakobi (Prof. Blümer/Prof. van Dongen)**, **Simone Jäger (former MAINZ secretary)**, and **MAINZ coordinator Mark Bajohrs** joined the group for a guided tour through Speyer. Many interesting details about the construction



Figure 3: Guided tour through Speyer.





of Speyers cathedral, which is a UNESCO world heritage site, were revealed. Furthermore, interesting facts about Jewish history and culture were given. A curious tradition in Speyer is the filling of the large chalice outside the cathedral with 1600 liters of the best wine of the region by every new bishop, which is then emptied by the citizens of the town.

On Wednesday **Stephan Rix (Prof. Felser)** started the first morning session with a talk on the finding of *metallic colloids in CaF*₂. High doses of 193 nm radiation lead to the formation of metallic Ca colloids in CaF₂. Then, **Christian Ludwig (Prof. Felser)** reported on his *investigations of Cu(In,Ga)Se*₂ (*CIGS) using Monte Carlo and the cluster expansion technique*. The In/Ga distribution in CIGS, which is a promising absorber material for solar cells, is important for its absorption properties. The session was concluded by **Shahab Naghavi (Prof. Felser)**, who presented theoretical studies on the *prediction of insulator to metal transition in rubidium sesquioxide (Rb*₄O₆) *under high pressure*. The effect of the bond length of O⁻ and O²⁻ was investigated.

After a coffe break and taking the group photo **Katja Medjanik (Prof. Schönhense)** gave insights on the *searching of the new charge-transfer complexes*. Next, **Anna-Maria Pütz (Prof. Rentschler)** reported on *new stable radicals with a phosphate substituent*. The synthesis of stable radicals was discussed. The final talk of the seminar was given by **Frank Reuter (Prof. Rentschler)** on *dinuclear complexes with bridging tetrasubstituted para-phenylendiamine as molecular magnetic units*, who spoke about the synthesis and of magnetic molecules.

Summing up, the seminar was very successful. In the scientific program every student presented some of his work, which led to many fruitful discussions. Furthermore, the seminar provided a relaxed atmosphere to connect with the other PhD students. The next MATCOR student seminar will be a joint seminar with POLYMAT and will take place from July 15-18, 2010, at Schloss Eringerfeld near Paderborn.