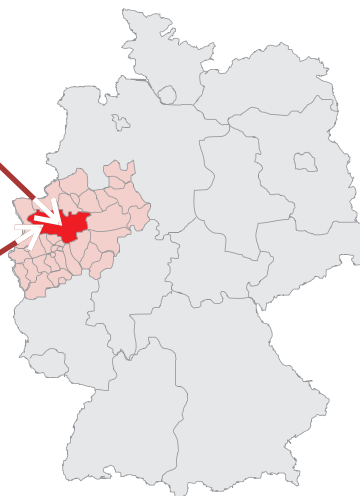


TP	project title	project leader
A2	In-situ STM-investigations of thin metallic films	U. Köhler
A4	Simulation and theory of spin-structures in magnetic film systems	K. Usadel
A5	Epitaxy and interface structure of magnetic heterostructures	K. Theis-Bröhl H. Zabel
A6	Spin-structures and interface properties of magnetic film systems	W. Keune
A7	Spin-structures and exchange-bias of magnetic metal-insulator-film systems	W. Kleemann
A8	Spatially resolved ferromagnetic resonance investigations of the anisotropy and the relaxation in Fe-semiconductor-heterostructures	M. Farle J. Pelzl R. Meckenstock
A9	In-situ ferromagnetic resonance und magnetometry of epitaxial Fe/semiconductor interfaces	M. Farle
A 11	Magneto-dynamics and micromagnetic structure of heterostructures	F.U. Hillebrecht C.M. Schneider
B1	Influence of magnetic interactions on the transport properties of low-dimensional electron gases	K. B. Efetov
B2	Spin-dependent transport in ferromagnet-semiconductor nanostructures	S.F. Fischer U. Kunze
B5	Electronic transport of nanostructured magnetic wires	G. Dumpich J. Lindner
B6	Transport theory of heterostructures	P. Entel
B7	Magneto-transport and tunnel phenomena of spin-polarized electrons in ferromagnetic film systems	K. Westerholt
B8	Proximity-effects in superconducting and magnetic heterostructures	K. B. Efetov
B9	Proximity-effects in layered systems of superconductors and ferromagnets	H. Zabel K. Westerholt
B 10	Optical confirmation of the spin-injection by using ferromagnetic contacts	M. Hofmann A. Wieck
B 11	Spin-dependent transport of magnetic nanostructures	J. König
B 12	Spin-dynamics of magnetic layered structures	G. Bacher
N 1	Spatially and temporally highly resolved imaging of magnetization reversal processes of magnetic nano- and heterostructures	T. Eimüller



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Magnetic Heterostructures: Spinstructure and Spintransport

Research Center of Excellence of the Deutsche Forschungsgemeinschaft

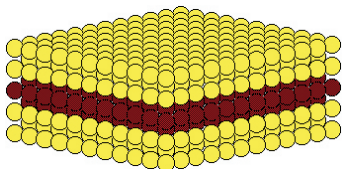
funded since January 2000





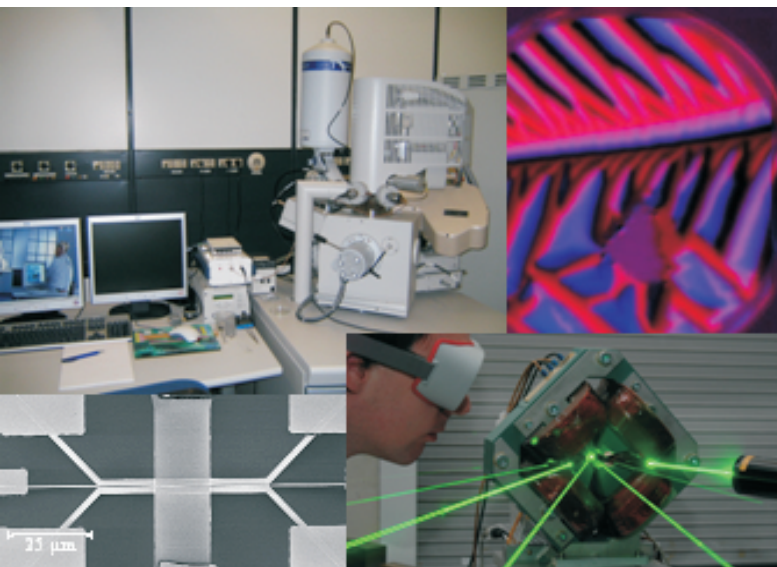
„Magnetic Heterostructures“

Heterostructures consist of combinations of different materials, which are in contact through at least one interface.



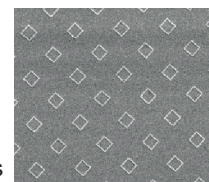
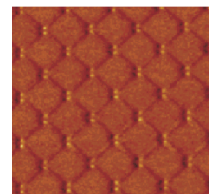
Heterostructures combine different physical properties which do not exist in nature. Examples are semiconductors/metals, superconductors/ferromagnets, or ferromagnets/antiferromagnets. These combinations promise to jointly display new physical properties different from any single one of them.

Heterostructures are generated by stack-wise deposition of different material layers and by lateral structuring using electron-beam and ion-beam techniques.



Research aims of the SFB 491:

- Growth of complex magnetic heterostructures
- Lateral structuring on length scales down to a few nanometers
- New physical properties through proximity-effects acting between ferromagnetic layers and antiferromagnetic, ferroelectric, semiconducting or superconducting layers
- Optimization of spin-polarized electron transport in heterostructures and of spin-injection in semiconductor materials
- Quantum transport in magnetic nanostructures



Some Highlights:

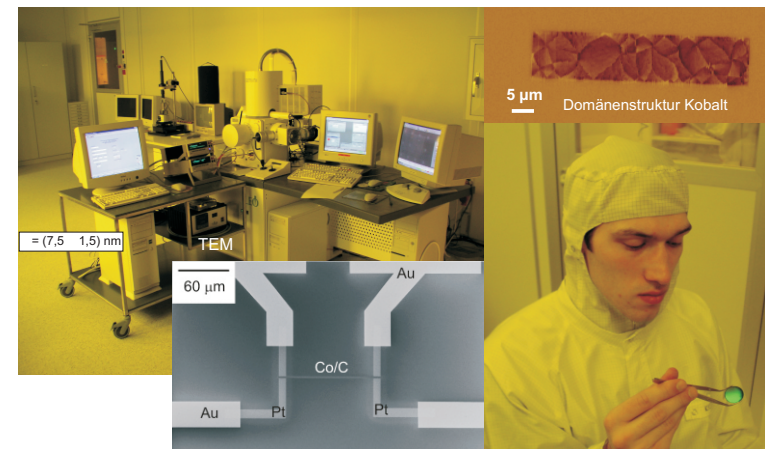
- First proof of spin-injection at remanence (*N.C. Gerhardt et al. APL 87 (2005) 032502*)
- First magneto-electrically controlled exchange bias (*P. Borisov et al. PRL 94 (2005) 117203*)
- Largest variation of the transition temperature for a superconducting spin-valve (*K. Westerholt et al. PRL 95 (2005) 097003*)
- Prediction of odd triplet-superconductivity for non-collinear S/F multilayers (*A.F. Volkov et al. PRL 90 (2003) 117006*)
- Quantitative description of the exchange bias effect (*G. Scholten et al. PRB 71 (2005) 64413*; *F. Radu et al. J. of Phys. 18 (2006) L29*)

Activities:

- Education of PhD students through special lectures and summer schools
- Seminars and Colloquia on latest topics of the SFB
- Organization of international workshops/symposia
- Consulting on applications regarding nanotechnology, magnetism, thin film characterization, lithography

for latest news and announcements see:

www.sfb491.de



„Spin-structure and spin-transport“

The Center of Excellence (SFB 491) investigates the basics of future information- and communication technologies based on the spin of electrons. Progress in this field requires to bridge literally semiconductor- and metal-physics by common interfaces in spintronic heterostructures. The SFB 491 has been funded by the Deutsche Forschungsgemeinschaft (DFG) since January 2000 and will continue in January 2006 with its third funding period at a funding level of 5.2 million Euro.

About 50 scientists are working within the SFB 491, 27 of them are young researchers (PhD students and postdocs) supported by research grants from the DFG. Within the third funding period (2006 - 2008), for the first time also the research center Jülich participates in the SFB 491.

The SFB is denoted for its very good interactions and collaborations between the various research groups located at the different sites in Bochum, Duisburg, and Jülich. The state-of-the-art research infrastructure allows all participating research groups to perform competitive research in the area of spintronics at the forefront of the international developments.



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