switching, i.e. the change in resistance vs. contact distance, shows a hysteretic behavior and presumably arises from the large magnetostriction of ferromagnetic Dy. Preliminary measurements show steps in the conductance-distance characteristics which are, however, much larger than one conductance quantum $G_0 = 2e^2/h$.

TT 22.30 Wed 14:00 Poster B

**Point contact spectroscopy of quench-condensed Ag films** — •Torben Peichl, Marcel Spurny, Michael Burst, and Georg Weiss — Physikalisches Institut, Universität Karlsruhe, 76128 Karlsruhe, Germany

We report on the progress in fabricating nanostructured point contacts as a result of our structural characterization studies. The point contacts are defined by electron beam lithography on top of silicon nitride membranes. Then the bottom side is covered with a layer of Au before a $SF_6$ plasma etching from the top side is used to obtain nano-sized holes in the membrane. Finally, a highly disordered Ag layer is prepared by quench-condensing Ag films at low temperatures <10 K on the top side. This results in metallic point contacts with diameters <50 nm and resistances between 1 and 10 Ω.

Electronic transport properties of these point contacts were studied at temperatures from 1.5 to 8 K by measuring the differential resistance using lock-in methods. Within sample series we find reproducible results, in particular a distinct minimum of the differential resistance which we identify as a zero-bias minimum shifted by a DC offset of yet unknown origin. This minimum becomes narrower at increasing temperatures and vanishes at 8 K. Similarly, the minimum diminishes continuously with magnetic field until it vanishes completely at about 2 T. Low energy excitations as well as coulomb blockade effects might be responsible for the observed behavior. Additionally, slight oscillations of the differential resistance curves are reminiscent of weak localisation effects.

TT 22.31 Wed 14:00 Poster B

**Charge transport properties of biphenyl molecules and tetrathiafulvalene** — •Marius Bürkle[1], Fabian Pauly[1], Janne Viljas[1,2], Juan Carlos Cuevas[3], and Gerd Schön[1,2] — [1]Institut für Theoretische Festkörperphysik and DFG-Center for Functional Nanostructures, Universität Karlsruhe, 76128 Karlsruhe, Germany — [2]Forschungszentrum Karlsruhe, Institut für Nanotechnologie, 76021 Karlsruhe, Germany — [3]Departamento de Física Teórica de la Materia Condensada, Universidad Autónoma de Madrid, 28049 Madrid, Spain

We study theoretically the charge transport properties of single molecule junctions. For this, we use a combination of density functional theory and Green's-function techniques [1]. In our analysis, we consider different types of molecules, namely biphenyl molecules and tetrathiafulvalene. For the biphenyl molecules, the tilt angle of the phenyl rings is changed continuously by means of alkyl chains of varied lengths. We investigate the dependence of both the tilt angle and the conductance on this chain length. In addition, we examine the conductance of tetrathiafulvalene.

[1] F. Pauly, Ph.D. Thesis, Universität Karlsruhe (2007).

TT 22.32 Wed 14:00 Poster B

**In-situ fabrication of nanobridges under ultra-high vacuum conditions** — •Dominik Stöffler[1], Hilbert v. Löhneysen[1,2], and Regina Hoffmann[1] — [1]Physikalisches Institut and DFG Center for Functional Nanostructures (CFN), Universität Karlsruhe, D-76128 Karlsruhe, Germany — [2]Forschungszentrum Karlsruhe, Institut für Festkörperphysik, D-76021 Karlsruhe, Germany

Contacting single molecules with nanostructured metallic leads remain a challenge, in spite of numerous attempts. We investigate nanocontact formation by thermally assisted electromigration of gold nanowires. The nanowires are prepared by electron beam lithography. An automatic feed-back allows to follow a line of constant dissipated power at the nanocontact, which leads to a gradual thinning of the wire until a small gap is formed. The fabricated gaps are smaller than 10 to 20 nm. By following the line of constant power, we estimate an increase of the temperature of the contact from 350 K in the thermal regime at the beginning, to 650 K in the ballistic regime at the end of the overall electromigration process. Due to the lithography process, leftovers such as PMMA remain on the metallic contacts, which eventually affect transport measurements with molecules. We introduce a promising alternative method to fabricate and contact clean metallic nanostructures, using evaporation through a mask under ultra-high vacuum. These structures can eventually be separated by electromigration to accommodate single molecules.

TT 22.33 Wed 14:00 Poster B

**Conductance measurements on palladium breakjunctions with superconducting leads** — •Stefan Egle, Cécile Bacca, Christian Schirm, and Elke Scheer — Department of Physics, University of Konstanz

We will present our recent results of palladium nanobridges connected by superconducting leads of aluminium. The structures are fabricated by using electron beam lithography and two-step shadow evaporation. By means of the mechanically controllable break junction (MCBJ) technique we are able to open the bridges to a one-atom contact and close again repeatedly at low temperatures, thus obtaining conductance histograms. Studying the properties of these palladium atomic point contacts at 270mK, we show the influence of the superconducting leads onto the electronic properties of palladium (proximity effect) by measuring the differential resistance. As expected, we observe a decrease of the $dV/dI$ for voltages $|V| \leq 120\mu V < \Delta_{Al} = 180\mu V$ which increases again when either the external magnetic field or the temperature is raised. Investigating the disappearence of this effect, we determine the critical values $B_c$ and $T_c$.

TT 22.34 Wed 14:00 Poster B

**Reversible Switching Effect in Atomic-Size Contacts** — •Christian Schirm, Hans-Fridtjof Pernau, and Elke Scheer — University of Konstanz, Department of Physics, 78457 Konstanz, Germany

We investigate electromigration effects in atomic-size contacts of aluminum fabricated with the mechanically controllable break junction technique at $T \leq 1.5$K. We observe current-driven conductance changes $\Delta G$ and analyze their influence on the conductance histogram. In particular situations a reversible switching between two conductance values is observed (> 100 repetitions) which attribute to the formation of preferred atomic configurations. A correlation between these configurations and conductance channels shall be established via the analysis of MAR in the superconducting state [1].

[1] E. Scheer et al., Phys. Rev. Lett. **78** (1997) 3535-3538

TT 22.35 Wed 14:00 Poster B

**Breakjunctions on Membranes** — •Reimar Waitz, Olivier Schecker, and Elke Scheer — Universität Konstanz, Germany

A so-called "mechanically controlled breakjunction" is made of a metallic wire with a suspended constriction. This constriction can be elongated until having - just before breaking - a diameter of one atom. In this project we developed a new kind of breakjunctions on silicon membranes. The wire is made by electron-beam lithography on top of a 600x600 micrometer crystalline silicon membrane with a thickness of a few hundred nanometers. In contrast to the "standard" breakjunction technique, we use the strain of the membrane to control the elongation of the wire. In our poster we present the process of sample fabrication and a mechanism for controlled breaking, which has successfully been used to measure the conductance of single atom contacts.

TT 22.36 Wed 14:00 Poster B

**Bias-dependent electronic transport in nanowires** — •Neng-Ping Wang and Stefan Heinze — Institute of Applied Physics, University of Hamburg, Jungiusstrass 11, 20355 Hamburg, Germany

Transport of electrons in nanoscale structures is of interest from a fundamental as well as an application point of view. Often nanoscale systems display nonlinear current-voltage characteristics, which make them interesting for device applications. Here, we report first principles calculations of bias-dependent ballistic transport in nanowires using the non-equilibrium Greens function method. The system under consideration is divided into a central scattering region attached to semi-infinite left and right leads. First, we use density functional theory (DFT) to calculate the electronic structure of the system. The DFT eigenstates are then transformed into a set of maximally localized Wannier functions (WFs). Using the WFs as localized orbitals, we construct the Hamiltonian of scattering region and leads, which is used for transport calculation. The coupling of the scattering region to the semi-infinite leads is described by the self-energies of the leads which we obtain with the particularly efficient decimation technique. We solve for the Green function of the system and calculate the transmission and current at low bias voltages.

As a first application of our approach, we study the I-V characteris-