with respect to the boundary. By means of the Eilenberger theory, we study the influence of an external magnetic field on the Andreev bound states and the screening currents. In particular, the current changes its direction at the surface and a splitting of the bound state can be seen. We study the temperature dependence and orientational dependence of this effect.

TT 8.16 Mon 14:00 Poster A

Superconductivity in a semiconductor - interband interaction — •Susanne Killiches[1] and Khandker Quader[2] — [1]Institut fuer Physik, Universitaet Rostock — [2]Department of Physics, Kent State University, OH USA

Recent experiments [Steiner,Kapitulnik, Physica C, Volume 422, Issue 1-2 p.16-26, 05/2005] have demonstrated that superconductivity can grow out of a non-metallic insulating phase. To explain that phenomena we study a simplified two band model. The idea for explanation is to introduce an attraction in the valence and conduction band of either intra- or inter band nature. The transition to a superconducting phase should occur if the gain in pairing energy by forming an electron-electron pair is greater than its cost [Jrome, Rice, Kohn, Phys. Rev. 158, 462475, 1967]. Using the Matsubara Greens function method, a gap equation for a semiconductor model in 2D is derived, allowing only for inter-band interaction [Nozieres, Pistolesi, European Physical Journal B, Volume 10, #4, 08/1999]. The characteristic gap equation is solved for zero and finite temperature numerically and the behaviour of the transition temperature depending on the excitation gap and order parameter is shown. We find superconductivity, if the coupling exceeds a certain threshold and obtain a successful model to describe the superconductor-insulator transition.

TT 8.17 Mon 14:00 Poster A

Novel superconducting graphite compound: CaC_6 - synthesis and conduction electron spin resonance study — •Ferenc Murányi, Grzegorz Urbanik, Vladislav Kataev, and Bernd Büchner — Leibniz Institute for Solid State and Materials Research Dresden, 01171 Dresden, PO BOX 270116, Germany

The superconductivity in calcium intercalated graphite (CaC_6) with transition temperature (T_c) of 11.5 K was discovered in 2005. The new material attracts great attention because of its high T_c among intercalated graphite compounds, highly anisotropic critical field (H_{c2}) and layered structure like MgB_2 or high temperature superconductors. Bulk intercalated samples were prepared during 10 days' heat treatment of graphite pieces at 350 °C in Li rich Ca/Li alloy. Conduction Electron Spin Resonance (CESR) lines were observed in the temperature range from 4 K to 300 K at 9.5 GHz, in two magnetic field orientations, H$\|$ c and H$\|$ ab. The lineshape can be described as a Dysonian line which is characteristic of thick slabs of metals. The g factor ($g_c = g_{ab}$ = 1.9984 +/- 0.0005), the linewidth ($w_c = w_{ab}$ = 4 +/- 0.5 G) and the intensity are typical for the metallic state, in both magnetic field orientations.

TT 8.18 Mon 14:00 Poster A

Angular dependant critical field and critical currents of epitaxial Holmium Nickel Borocarbide Thin Films — •Tim Niemeier, Ruben Hühne, Günter Behr, Ludwig Schultz, and Bernhard Holzapfel — IFW Dresden, P.O. Box 270116, 01171 Dresden

Epitaxial thin films of $HoNi_2B_2C$ and related superconducting rare earth borocarbide compounds act as a suitable basis for numerous investigations on structural and superconductive properties such as T_c, H_{c2} and J_c.

A new batch of $HoNi_2B_2C$ thin films was grown on ceramic single crystal magnesium oxide substrates under ultra-high vacuum conditions using pulsed laser deposition. A detailed view on the deposition parameters and the physical film properties is presented and angular H_{c2}- and J_c-measurements are shown.

TT 8.19 Mon 14:00 Poster A

Determination of the band structure of $LuNi_2B_2C$ — •Beate Bergk[1,2], Marek Bartkowiak[1], Oleg Ignatchik[1], Manfred Jäckel[2], Joachim Wosnitza[3], Helge Rosner[3], Vivien Petzold[3], and Paul Canfield[4] — [1]Hochfeld-Magnetlabor Dresden, Forschungszentrum Dresden-Rossendorf, D-01314 Dresden, Germany — [2]Institut für Festkörperphysik, TU-Dresden, D-01062 Dresden, Germany — [3]MPI für chemische Physik fester Stoffe, D-01187 Dresden, Germany — [4]Condensed Matter Physics, Ames Laboratory, Ames, Iowa 50011,

We present de Haas-van Alphen (dHvA) investigations on the non-magnetic borocarbide superconductor $LuNi_2B_2C$ which have been performed by use of the torque method in high magnetic fields up to 32 T and at low temperatures down to 50 mK. The complex band structure is extracted from the quantum oscillations in the normal state. In comparison with full-potential-local-orbital calculations of the band structure we are able to assign the observed dHvA frequencies to the different bands. Temperature dependent dHvA investigations allowed the extraction of the effective band masses for the several Fermi-surface sheets. We observe an enhancement of the effective masses compared to the theoretical calculations which is due to electron-phonon interaction. Finally, we are able to examine the angular dependence of the electron-phonon coupling for the different Fermi-surface sheets.

TT 8.20 Mon 14:00 Poster A

Superconductivity and electron-phonon coupling in doped MgB_2 and related compounds — •Vivien Petzold[1], Klaus Koepernik[1,2], and Helge Rosner[1] — [1]MPI CPfS Dresden, Germany — [2]IFW Dresden, Germany

Recently, substitutions on the Mg site in MgB_2, e.g., $Mg_{1-x}Sc_xB_2$, $Mg_{1-x}(AlLi)_xB_2$ were investigated intensively. For achievable doping levels, $Mg_{1-x}Sc_xB_2$ shows only very small structural changes but clear changes in the electronic structure, whereas AlLi doping affects the lattice parameters but has almost no influence on the electronic structure. Our theoretical approach comprises different approximations in the framework of band structure calculations: the rigid band and virtual crystal method as well as supercell calculations and coherent potential approximation. We show that the latter two lead to consistent results with respect to lattice expansion and electronic properties. We show that lattice effects are of minor importance. Concluding that the B 2p σ states remain the most relevant subsystem with regard to superconductivity, we calculated the electron phonon coupling constant λ and the critical temperature T_c. In contrast, for ZrB_2 as a typical representative of transition metal diborides TB_2 we find the sp^2(B)-d(T) hybridization to be crucial. Comparing calculated and measured angle dependent dHvA-data we show that: (i) LDA provides an excellent description of the electronic structure of TB_2. (ii) The electron phonon coupling is too small to expect superconductivity above a few mK for the stoichiometric compounds.

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TT 8.21 Mon 14:00 Poster A

Nonlinear Temperature Dependence of the Upper Critical Magnetic Field for Magnesium Diboride — •Thomas Koch[3], Thomas Schimmel[3,4], Maria Palistrand[2], Vladimir Zdravkov[1], and Anatolie Sidorenko[1] — [1]Institute of Electronic Engineering and Industrial Technologies, ASM, MD-2028 Kishinev, Moldova — [2]Institute of Applied Physics, ASM, MD-2028 Kishinev, Moldova — [3]Institute of Nanotechnology, Forschungszentrum Karlsruhe D-76021 Karlsruhe, Germany — [4]Institute of Applied Physics, University of Karlsruhe D-76128 Karlsruhe, Germany

The temperature dependence of the upper critical magnetic field, Hc_2(T), for MgB_2 films was investigated. As one result a nonlinear behavior of Hc_2(T) shown in the positive curvature in the H(T) plots is found to be an intrinsic property of the novel superconducting material. The experimental results are compared with the calculations made within the theoretical model of inter-band interaction for multi-band superconductors.[1]

Reference 1. M. E. Palistrant, Upper Critical Field Hc_2 in Two-Band Superconductors, Mold.Journ. Phys.Sci 3 (2004) 61

TT 8.22 Mon 14:00 Poster A

Enhanced superconductivity of Pb nanograins on a biological substrate — •T. Herrmannsdörfer[1], O. Ignatchik[1], T. P. Papageorgiou[1], F. Pobell[1], C. Walter[1], J. Wosnitza[1], C. Hennig[2], M. Merroun[2], K. Pollmann[2], J. Raff[2], S. Selenska-Pobell[2], and J. von Borany[3] — [1]Hochfeld-Magnetlabor Dresden (HLD), — [2]Institut für Radiochemie, — [3]Institut für Ionenstrahlphysik und Materialforschung, Forschungszentrum Dresden-Rossendorf, D-01314 Dresden, Germany

Nanogranular materials attract more and more attention due to their exciting physical properties as well as their key role in future technologies. Compared to their bulk counterparts, nanogranular materials can reveal strongly altered properties. As an example, we have demonstrated that the Stoner enhancement factor of the d conduction-electron susceptibility of Pd and Pt nanoclusters is clearly reduced