HIGH T_C UPDATE

VOL. 12, NO. 22
NOV. 15, 1998

DMS/BES/DOE
ARPA

NOTA BENE: **For her research in novel materials, including pioneering experiments on tunneling and proximity effects in superconductors and for elucidating the origin of fundamental surface effects in high-temperature superconductors, Laura H. Greene, University of Illinois (Urbana) was awarded this year's E. O. Lawrence Award.**

Readers please note: **Our Web site is located at http://www.iitap.iastate.edu/htcu/htcu.html. Some of you are still trying to access the old address (http://www.physics.iastate.edu/htcu/htcu.html) which is no longer in service. Please change bookmarks!**

Bi Cuprates

Using a break-junction technique, A. Mourachkine (Brussels) has done electron-tunneling spectroscopy in $Bi_2Sr_2CaCu_2O_{8+\delta}$ *(Bi-2212)* single crystals in the temperature range 14 K to 290 K to determine the origin of the pseudogap. The author found a pseudogap with $T^* \approx$ 280-290 K in overdoped samples and $T^* >$ 290 K in underdoped samples. The author considered several possible models for the pseudogap: (a) precursor pairing, (b) a charge-density-wave gap (CDW), and (c) a spin gap due to antiferromagnetic (AF) correlations. The author found that only the model involving antiferromagnetic correlations, possibly in the presence of a CDW, fits the data.

The diffusion of oxygen in dense polycrystalline $(Bi,Pb)_2Sr_2Ca_2Cu_3O_{10+\delta}$ *[(Bi,Pb)-2223]* fabricated by sinter forging has been measured by J.-H. Park (Argonne) et al. The anisotropic chemical diffusion coefficients in pure O_2 were found to be $D_{ab} = (1.8 \times 10^{-3}\ cm^2/s)\ exp(-0.96\ eV/k_BT)$ within the ab plane and $D_c = (2.3\ cm^2/s)\ exp(-1.77\ eV/k_BT)$ in the c direction. The faster diffusion along the ab plane appears to occur via an interstitial mechanism, while the slower diffusion in the c direction evidently occurs via a vacancy mechanism. The results are similar to those reported for oxygen diffusion in *Bi-2212*.

A compressive-anneal-processing (CAP) technique, in which a continuous uniaxial pressure is applied during annealing, has been developed by Y. T. Zhu et al. (Los Alamos) for processing oxide-powder-in-tube (OPIT) *Bi-2223* superconductor tapes. The authors found that this process promotes texture formation, enhances reaction kinetics, prevents desintering and bloating, and significantly improves the critical current density.

The I-V characteristics, transport critical current density at 77 K in moderate magnetic fields, and irreversibility fields have been measured by V. Beilin et al. (Hebrew University) in *Bi-2223/Ag* tapes at various stages of the OPIT process. The authors found that a combination of intermediate deformation with subsequent sintering improves the pinning characteristics of the tapes, reasonably increases the vortex-glass to vortex-liquid crossover field H_g, and significantly enhances the critical current during subsequent thermal processing.

A preprint by S. X. Dou (Wollongong) et al. reports studies of phase transformations at various temperatures during the processing of *Bi-2223/Ag* tapes. The authors found that the optimum annealing temperature of the second step in their two-stage sintering procedure was around 825°C, where all the low-T_c phases and impurities were at a minimum.

$RBa_2Cu_3O_{7-\delta}$

The effect of the grain-boundary plane on the superconducting current transport in 90°[100] $YBa_2Cu_3O_{7-\delta}$ *(YBCO)* grain boundaries extracted from cubic *Nd-Ba-Cu-O* seeded, five-domain $YBa_2Cu_3O_{7-\delta}$ samples has been investigated by M. B. Field (Argonne) et al. In transport measurements at 77 K, the authors found that the critical current density J_c is sensitive to low magnetic fields in both 90°[100] twist and symmetric tilt grain boundaries, and that the symmetric tilt boundaries have a lower zero-field J_c and a higher grain-boundary resistivity.

The angular dependence of the critical currents in a moderately twinned $NdBa_2Cu_3O_{7-\delta}$ *(NBCO)* single crystal has been investigated by M. Jirsa et al. (SRL-ISTEC) in the temperature range 30 K ≤ T ≤ 90 K. The authors find evidence for competition between pinning by twin planes and that by isotropic random pinning disorder. In intermediate fields around the fishtail peak up to 90 K, the authors observed a reduction of critical current density due to twin structure. This suggests that vortices retain their 3D character practically up to T_c.

Flux distributions obtained after field-cooling of melt-processed superconductors $(Nd_{0.33}Eu_{0.33}Gd_{0.33})Ba_2Cu_3O_{7-\delta}$ *(NEG)* and $(Nd_{0.33}Sm_{0.33}Gd_{0.33})Ba_2Cu_3O_{7-\delta}$ *(NSG)* have been analyzed by M. R. Koblischka et al. (SRL-ISTEC) using magneto-optical imaging. The authors propose such flux patterns as an ideal means to study the interactions between the flux-line lattice and the microstructure of the sample, since the fully penetrated state can be reached even in bulk samples. In addition, in remanent states obtained after field-cooling, the presence of weak channels in the sample can be observed if the applied field is large enough.

Magnetization and magneto-optical investigations of $(Nd_{0.33}Eu_{0.33}Gd_{0.33})Ba_2Cu_3O_{7-\delta}$ *(NEG),* $(Sm_{0.33}Eu_{0.33}Gd_{0.33})Ba_2Cu_3O_{7-\delta}$ *(SEG),* and $(Nd_{0.33}Sm_{0.33}Gd_{0.33})Ba_2Cu_3O_{7-\delta}$ *(NSG),* melt-processed in a reduced oxygen atmosphere, have been carried out by A. Das et al. (SRL-ISTEC). The $J_c(B)$ curves derived from magnetization loops show a strongly developed secondary peak effect. At 77 K and above, *NSG* and *SEG* were found to have similar properties, which are different from those of the *NEG* sample. The current-carrying length scale was determined from the reverse leg of the magnetization hysteresis loops and was found to approach the radius of the sample.

Other Cuprates

Neutron-scattering studies of various aspects of crystalline and magnetic structure in single crystals of $La_{1.6-x}Nd_{0.4}Sr_xCuO_4$ with x = 0.12 and 0.15 have been carried out by J. M. Tranquada (Brookhaven) et al. The authors found that: (a) At low temperature, where the *Cu* spins order in a nearly two-dimensional stripe structure, the magnetic correlation length remains finite, suggesting disorder in the stripe spacing. (b) The temperature dependence of the correlation length above 30 K is similar to that of the normalized classical regime of a 2D Heisenberg antiferromagnet, and applying the formula for the spin-only system yields a measure of the effect that the charge stripes have on the effective spin-wave velocities. (c) Within the low-temperature orthorhombic phase, there is a correlation between the deviation of the resistivity from a linear temperature dependence and the volume fraction of low-temperature-tetragonal-like domains.

As noted by D. Djajaputra and J. Ruvalds (Virginia), neutron-scattering experiments at low frequency reveal susceptibility peaks in $La_{2-x}Sr_xCuO_4$ that diverge as the temperature is lowered toward the superconducting transition. This divergence at a nesting momentum stands out from the conventional Pauli susceptibility of this cuprate at low wavelengths. The authors explain the peak singularity by calculating many-body Coulomb correlations that originate from Fermi-surface nesting and dominant vertex corrections. The authors sum the leading singularities using the parquet method and find that the susceptibility diverges as $T^{-\alpha}$, where α depends on the Coulomb interaction.

The thermal resistivity of manganites and cuprates has been measured by J. L. Cohn (Miami) and found to correlate with local lattice distortions and the presence of localized holes as determined from neutron diffraction and nuclear quadrupole resonance. Oxygen-doping-dependent studies of heat conduction in $YBa_2Cu_3O_{7-\delta}$ and *Hg* cuprates suggest that some of the holes in the CuO_2 planes are localized near the planar hole concentration p = 1/8. The results are consistent with the formation of short-ranged static stripe domains pinned near oxygen vacancy clusters.

Measurements of the in-plane thermal conductivity κ of $YBa_2Cu_4O_8$ *(Y-124)* single crystals have been carried out by J. L. Cohn (Miami) and J. Karpinski (ETH-Zürich) in the temperature range 4 K ≤ T ≤ 300 K. For transport perpendicular to the *CuO* chains, $\kappa_a(300\ K) \approx 10$ W/mK, and along the chains, $\kappa_b(300\ K) \approx 40$ W/mK. The authors compare the temperature dependence and anisotropy of κ in *Y-124* with those in $YBa_2Cu_3O_{7-\delta}$ *(Y-123).*

Measurements of the thermopower of La_2CuO_{4+z} and Nd_2CuO_{4-y}, which undergo an antiferromagnetic transition near room temperature, and $Bi_2Sr_{2-x}La_xCuO_{6+x}$, for which a broad spectrum of doping is possible, are reported by M.-Y. Choi and J. S. Kim (Sungkyunkwan). The data suggest that the thermopower of high-T_c cuprates contains a large amount of extra contribution in addition to the usual diffusion thermopower. The authors discuss possible origins of this extra contribution.

A preprint by J. S. Zhou (Texas-Austin) et al. reports measurements of the temperature dependence of the resistivity and thermoelectric power under hydrostatic pressure of a single-crystal film of $La_{1.85}Sr_{0.15}CuO_4$ deposited on $LaSrAlO_4$. The compressive stress built into the film allowed access to the orthorhombic-tetragonal transition in a *Be-Cu* pressure chamber. T_c increased with pressure for P < 3.3 kbar, but saturated at a pressure-independent T_c = 43.7 K in the tetragonal phase stabilized at pressures P > 3.3 kbar. The authors discuss the data within the framework of a vibronic model of the superconductive phase. A related paper by J. S. Zhou and J. B. Goodenough (Texas-Austin) discusses experiments demonstrating the structural

sensitivity of the transport properties of the high-T_c cuprates, and proposes a model in which itinerant vibronic states become increasingly stabilized with decreasing temperature.

According to a preprint by L. Jansen (ETH-Zürich) and R. Block (Amsterdam), substantial increases of the superconducting transition temperature T_c under pressure (e.g., a doubling of T_c) are theoretically restricted to systems with a low initial T_c. The authors use their theory based on an indirect-exchange approach to high-temperature superconductivity to reach this conclusion.

Transport properties of $La_{2-x}Sr_xCu_{1-y}Zn_yO_4$ in the overdoped region have been investigated by N. Kakinuma et al. (Tohoku). In a narrow region around x = 0.22 and y = 0, the authors found anomalously less metallic behaviors of the electrical resistivity and thermoelectric power. The authors tentatively attribute the anomalous behavior to some kind of ordering of holes and/or spins.

As reported by P. Fournier (Maryland) et al., normal-state-resistivity measurements at high fields and low temperatures in electron-doped $Pr_{2-x}Ce_xCuO_4$ thin films reveal an insulator-metal crossover near a doping level $x \approx 0.15$, similar to a previous report on hole-doped $La_{2-x}Sr_xCuO_4$. The authors conclude that the ground state at x = 0.15, corresponding to the maximum transition temperature, is equivalent for hole- and electron-doped cuprates.

Vortices

A theoretical study of the low-temperature properties of the vortex state in a d-wave superconductor in a magnetic field parallel to the c axis is reported in a preprint by G. Wang and K. Maki (USC). The authors use the Brandt-Pesch-Tewordt Green function appropriately modified for a d-wave superconductor. The authors find that the quasiparticle density of states, low-temperature specific heat, magnetization, and nuclear spin-lattice relaxation rate exhibit scaling behavior for small magnetic fields $B/H_{c2}(0) \leq 0.026$.

Making use of the Bogoliubov-de Gennes equation, M. Kato (USC and Osaka) and K. Maki (USC) have studied the quasiparticle spectrum and vortex-core structure of a single vortex in quasi-2D s-wave superconductors for small $p_F\xi_0$, where p_F is the Fermi momentum and $\xi_0 = v_F/\Delta_0$ is the coherence length ($\hbar = 1$). (Recall that $p_F\xi_0 >> 1$ for conventional superconductors.) The authors found that the number of bound states in the core decreases rapidly as $p_F\xi_0$ decreases (e.g., to only three for $p_F\xi_0 = 1$) and that the Kramer-Pesch effect (shrinkage of the vortex core with decreasing temperature) stops around $T/T_c \approx 0.3$ for $p_F\xi_0 \sim 1$.

As noted in a paper by R. P. Huebener et al. (Tübingen), for the superconducting mixed state in the clean limit, the electronic density of states $N(\varepsilon)$ above the Fermi energy ($\varepsilon = 0$) is determined by the bound states in the vortex core, which have the minigap ε_0 as a prominent feature. Quasi-classically, $N(\varepsilon)$ also shows a steep increase near the energy gap Δ. Since $N(\varepsilon)$ provides the phase space for quasiparticle scattering, these features are expected to strongly affect the flux-flow resistance. The authors' recent observation of two intrinsic flux-flow-resistance steps in epitaxial films of $Nd_{2-x}Ce_xCuO_4$ are explained in terms of these features of $N(\varepsilon)$ near $\varepsilon = \varepsilon_0$ and $\varepsilon = \Delta$. In turn, the instabilities observed in current-bias experiments are described in terms of an electric-field-dependent resistance.

A preprint by P. Chaddah and S. B. Roy (Indore) points out differences in the magnetic behavior of $CeRu_2$ and $Bi_2Sr_2CaCu_2O_{8+\delta}$ *(Bi-2212).* The dc magnetization data show a first-order phase transition in the vortex state of $CeRu_2$, with the phase of higher entropy showing enhanced pinning. Minor hysteresis loops show evidence of super-cooling of the higher-entropy phase as the phase boundary is crossed either isothermally or at constant field. These features were not found across the Bragg-glass to vortex-glass transition in *Bi-2212.*

Granularity Effects

The electrical conductivity and specific heat near the superconducting transition of granular samples of $YBa_2Cu_3O_{7-\delta}$, $YBa_2(Cu_{2.98}Zn_{0.02})O_{7-\delta}$, and $GdBa_2Cu_3O_{7-\delta}$ have been measured by A. R. Jurelo (Porto Alegre and Ponta Grossa) et al. The authors found that the regime of approach to the zero-resistance state, when it occurs well below the intragrain pairing transition, is dominated by critical fluctuations of a coherence transition of the granular array. They also assert that the relevant thermodynamics for this problem is obtained from the phase-glass Hamiltonian, which belongs to the 3D XY universality class.

A preprint by M. Polichetti (Salerno) et al. reports ac susceptibility measurements of polycrystalline $YBa_2Cu_3O_{7-\delta}$ over a wide range of frequencies ($1\text{-}10^5$ Hz). Within a model including intergrain shielding currents and a surface barrier on the grains, the authors find evidence for a decrease of the height of the barrier with increasing frequency.

Thin Films

Results on the superconductor-to-insulator transition in two-dimensional films of *MoGe* are analyzed in a preprint by N. Mason and A. Kapitulnik (Stanford) in terms of coupling of the system to a dissipative bath. The authors note that as the temperature decreases, the parameter that controls this

coupling becomes relevant and a wide range of metallic phase is recovered.

A method for making electrical contact to ultrathin films of $YBa_2Cu_3O_{7-\delta}$ *(YBCO)* in superconducting field-effect transistors (SuFETs) is described in a preprint by H. Inada et al. (Sumitomo Electric). Contact was made at the edges of contact holes in a $SrTiO_3$/*YBCO* film. The holes were made by *Ar* ion milling or a focused ion beam (25 holes of dimensions $5 \times 5\ \mu m^2$), and a noble metal was deposited by evaporation. Using this buried-contact structure, a specific contact resistance of $3 \times 10^{-8}\ \Omega\ cm^2$ was achieved on a *YBCO* film of thickness 5 nm.

Applications

The design and testing of a vibration isolator consisting of a high-temperature superconductor (such as melt-textured *YBCO*) and a permanent magnet are reported by J.-H. Yu (TCSUH) et al. The device is proposed for space structures, where the coupling between multiple substructures or mechanical parts needs to provide a transmission of force between the two systems while blocking out the propagation of the vibration energy from one system to the other. The authors note that such a passive device in space applications is superior to similar active devices, which often require bulky control circuit boxes and consume considerable energy not readily available in the space environment.

Theory

A two-dimensional exciton model showing the possibility of two-exciton pairing in cuprates, both in singlet and triplet states, is proposed in a preprint by F. Shi (LBNL). The singlet states are assumed to be responsible for the superconductivity, and the triplet states for the unusual normal-state properties. The phase diagram of the model shows insulator-superconductor and superconductor - normal-metal transitions with doping.

Feedback effects due to spin-fluctuation-induced precursors in the fermionic quasiparticle spectrum have been taken into account by J. Schmalian (Illinois-Urbana) in the description of a quantum critical point of itinerant spin systems. The author obtains, within a one-loop renormalization-group approach, a quantitative explanation for the scaling behavior seen by inelastic neutron scattering in underdoped cuprate superconductors.

A diagrammatic low-energy boson-exchange strong-coupling model for an antiferromagnetically correlated polaronic metal has been developed by J. Zhong and H.-B. Schüttler (Georgia). The model is based on a simplified local-anharmonic-oscillator representation of the highly anharmonic Born-Oppenheimer lattice potential, which typically arises in a finite-density polaron system as a result of polaronic self-localization. The authors suggest possible low-temperature isotope-effect experiments to explore the relevance of this theory to the cuprate superconductors.

A preprint by C.-H. Pao (National Chung Cheng) and H.-B. Schüttler (Georgia) describes an efficient numerical renormalization group (NRG) technique to solve the fluctuation exchange (FLEX) approximation used in studying the Holstein-Hubbard model. The authors found that the isotope effect for s-wave pairing is BCS-like in a realistic phonon frequency range, but vanishes at unphysically large phonon frequency (~band width). For d-wave pairing, the isotope exponent is negative and small compared with typical observed values in non-optimally doped cuprates.

Studies of the influence of fluctuations in superconductors with a non-Fermi normal state are reported in preprints by M. Crisan (Cluj) et al. and by I. Tifrea et al. (Cluj). The first of these reports that fluctuations give a temperature dependence to the pseudogap induced in the fermionic excitations, and the second describes the effect of fluctuations on the specific heat.

Detailed numerical calculations of the upper critical field for a bulk extreme type-II superconductor are reported by S. Dukan and O. Vafek (Goucher). To examine the high-field, low-temperature regime of the H-T phase diagram, the authors show that it is necessary to go beyond the standard semiclassical theory and include the effects of Landau quantization. The authors conclude that such effects induce an upward curvature in $H_{c2}(T)$ at ~10% of T_c in superconductors for which the magnitude of the slope of $H_{c2}(T)$ at T_c is $\geq$0.2 T/K.

The effects of chain disorder on superconductivity in $YBa_2Cu_3O_{7-\delta}$ are discussed in a preprint by W. A. Atkinson (Indiana) within the context of a proximity model. Penetration-depth and specific-heat measurements probe the pair-breaking effects of chain disorder, and the author discusses these at the level of the self-consistent T-matrix approximation. The author finds quantitative agreement with experiment when chain disorder is present.

The effects of nonmagnetic impurities on the high-temperature superconductors have been studied by M. Bayindir and Z. Gedik (Bilkent), who solved the Bogoliubov-de Gennes equations self-consistently on a two-dimensional lattice using an exact diagonalization technique. The authors' results support $d_{x^2-y^2}$-wave symmetry for tetragonal and s + $d_{x^2-y^2}$-wave symmetry for orthorhombic structure.

Using a Green function method, V. Prokic (Belgrade) et al. investigate theoretically a model of atomic-scale supercon-

ductor/ferromagnet (S/F) superlattices. In this model, the phase of the order parameter changes periodically, and the intrinsic phase difference ϕ in the ground state can be zero or π. The authors find that the critical Josephson current has a nonmonotonic dependence on the exchange field h in F, becoming zero at the critical value $h_{crit}(T)$, corresponding to the transition between $\phi = 0$ and $\phi = \pi$ in the ground state.

A preprint by S. Östlund (Chalmers University of Technology) discusses the Ginzburg-Landau theory of a Josephson junction consisting of a pure d-wave superconductor oriented with its [110] axis normal to the junction and, on the other side, either an s-wave superconductor or a d-wave superconductor with its [100] axis normal to the junction. The author uses symmetry arguments to show that the Josephson current as a function of the phase must have the form $J(\phi) = J_1\sin(\phi) + J_2\sin(2\phi)$. In principle, J_1 vanishes for a perfect junction of this type, but anisotropy effects, due either to ab-axis asymmetry or junction imperfections, can easily cause J_1/J_2 to be quite large, even in a high-quality junction. However, if J_1/J_2 is sufficiently small and J_2 is negative, local time-reversal symmetry breaking will appear. Arbitrary values of flux would then be pinned to corners between such junctions and occasionally on junction faces, which is consistent with experiments on grain-boundary junctions.

The induction of an s-wave component in a d-wave superconductor, such as *YBCO,* has been considered by J. X. Zhu and C. S. Ting (TCSUH). Near the edges of such a sample along {110} directions, the induced s-wave order parameter, together with the d-wave component, forms a complex combination $d + e^{i\phi}s$, which breaks the time-reversal symmetry (BTRS) of the pairing state, thereby generating a spontaneous current. The authors numerically study the current distribution and the formation of the spontaneous flux induced by the current. The authors show that the spontaneous flux formed from a number of defect lines with {110} orientation has a measurable strength, which suggests an unambiguous way to check the existence of the BTRS pairing state at {110} boundaries.

Other Activities

In conventional superconductors, a minimum in the losses in an ac magnetic field often has been observed as a function of the dc bias field amplitude. A preprint by P. Dolez (Sherbrooke) et al. reports the first observations of a similar minimum in a high-temperature superconductor (here, a silver-gold-sheathed *Bi-2223* tape), and the first in any superconductor carrying a dc bias current in addition to the usual ac transport current.

Overviews

As discussed in a book chapter by C.-J. Kim (KAERI), the melt-textured-growth (MTG) process is an effective method to produce *YBCO* superconductors with high critical current density J_c. This technique utilizes a peritectic reaction between Y_2BaCuO_5 *(211)* and *Ba-Cu-O* (*Ba:Cu* = 3:5) liquid to form $YBa_2Cu_3O_{7-\delta}$ *(123)* grains. In this preprint, the author discusses *211* refinement by chemical additives and the distribution of second-phase particles and pores (80 refs.).

A review by G. W. Crabtree et al. (Argonne) discusses the experimental vortex phase diagram of $YBa_2Cu_3O_{7-\delta}$, with emphasis on first-order vortex melting, the upper and lower critical points on the melting line, and the effect of disorder arising from twin-boundary and point-defect pinning (69 refs.).

An introduction to d-wave superconductivity has been prepared by H. Won (Hallym) et al. The authors briefly survey experiments supporting d-wave superconductivity in hole-doped high-T_c cuprates and then present a weak-coupling theory for d-wave superconductors. The authors also discuss the dramatic effects of impurity scattering in d-wave superconductors (49 refs.).

Contributed by John R. Clem

Contents:

***High-T_c Update* is available without charge to interested persons. Recipients are expected to participate in this information exchange by sending us preprints, reprints, meeting news, research news, etc. Contributions to defray the cost of newsletter printing and mailing are welcome.**

TECHNOLOGY NEWS

(Also see Applications section of Nota Bene.)

This section describes progress in manufacturing, product development, and technology transfer in the high-T_c superconductivity field. Please send your contributions (product development information, news regarding technology transfer efforts, or any information you would like to share about your corporation or laboratory) to the editor.

A unique process for selecting prime particles with the greatest critical current for use in fabricating HTS materials has been developed by Separator, Ltd. (Israel). This process, known as Electromagnetic Separation (EMS),

is based on the interaction of HTS particles and an alternating magnetic field at temperatures close to the transition temperature and extracting particles with optimal electrophysical qualities from the mechanical compound, creating a concentration of enriched particles with greater critical current. The EMS process has shown promise in its ability to obtain superior superconducting materials and also provides an effective method in the testing and analyzing final powders to determine if adjustments are necessary in the synthesis process to achieve optimal material properties. It can also be used as express examination of the powders, because velocity of the powders characterizes the quality of the material and the critical current (I_C) of the powders.

With the separation, one can obtain "concentrates"– the powder rich with HTS phases with certain characteristic J_C values or certain stoichiometries. Separator, Ltd., is in the final stages of development in preparation for the introduction of EMS to the commercial market as a viable technology for producing optimum HTS materials. Eurotech is actively marketing the EMS technology. For more information, contact Efim Broide, General Manager of Separator, Ltd., Building 13A, Kiryat Weizmann Science Park, Ness-Ziona 70400, Israel; telephone +972 8 940 8733; telefax +972 8 940 8085; e-mail broide@inter.net.il.

Contributed by Sreeparna Mitra

PREPRINTS

To obtain a particular preprint, contact the first author at the address given at the end of the citation. Help us expand this list by sending us your complete preprint. **Please specify where and when your paper was submitted.** An * next to an entry indicates it is a correction or revision of a previous entry. PACS codes and/or key words are given at the end of the citation.

W. A. Atkinson, "Disorder and Chain Superconductivity in $YBa_2Cu_3O_{7-\delta}$." Preprint #IUCM98-015; submitted to Phys. Rev. B. Department of Physics, Indiana University, Bloomington, IN 47405; e-mail atkinson@gibbs.physics.indiana.edu; preprint also available at cond-mat@xxx.lanl.gov (#9810199). 74.20.-z; 74.25.-q; 74.25.Ha; 74.25.Bt.

M. Bayindir and Z. Gedik, "Suppression of Superconductivity in High-T_C Cuprates Due to Nonmagnetic Impurities: Implications for the Order Parameter Symmetry." Preprint #BIL-PHYS-MB-ZG-3; submitted to Phys. Rev. B. Department of Physics, Bilkent University, Bilkent 06533, Ankara, TURKEY; e-mail bayindir@fen.bilkent.edu.tr; Z. Gedik's telephone +90 312 290 1388; e-mail gedik@fen.bilkent.edu.tr; preprint also available at cond-mat@xxx.lanl.gov (#9810202). 74.62.Dh; 74.72.-h; 74.20.-z; 74.72.Bk.

V. Beilin, A. Goldgirsh, E. Yashchin, M. Roth, and M. Schieber, "Effects of Deformation on Current-Limiting Factors in *Ag/BiSCCO* Tapes." To be published in Physica C. Crystal Growth and Electronic Materials Laboratory, School of Applied Science, Bergman Bldg., Hebrew University of Jerusalem, Jerusalem 91904, ISRAEL; telephone +972 2-658 6414; telefax + 972 2-658 6412 or -566 3878; e-mail beilin@shum.cc.huji.ac.il. Key words: *Bi-2223* tapes, weak links, flux pinning, intermediate deformation.

A. Belger, U. Jaenicke-Rössler, D. Lipp, B. Wehner, P. Paufler, and G. Behr, "Structure Refinement of the Superconducting Phase YNi_2B_2C as a Function of Temperature in the Range 25-300 K." To be published in Physica C (in press). Contact Peter Paufler, Institut für Kristallographie und Festkörperphysik, Fachrichtung Physik der Technischen Universität, D-01062 Dresden, GERMANY; telephone +49 351 463 4670; telefax +49 351 463 7048; e-mail paufler@physik.tu-dresden.de. Key words: structure refinement, thermal expansion, intermetallic borocarbides. 61.12.Ld; 62.20.Dc.

P. Chaddah and S. B. Roy, "Evidence for Supercooling Across a Vortex-Matter Phase Transition: Studies on $CeRu_2$ and $Bi_2Sr_2CaCu_2O_8$." Presented at the 5th IUMRS Int. Conf. in Asia, Bangalore, India, Oct. 13-16, 1998. Low Temperature Physics Group, Centre for Advanced Technology, Indore 452013, INDIA. Key words: vortex-matter transition, supercooling, $CeRu_2$, $Bi_2Sr_2CaCu_2O_8$.

Mu-Yong Choi and J. S. Kim, "Thermopower of High-T_C Cuprates." To be published in Phys. Rev. B. Department of Physics, Sung Kyun Kwan University, Suwon 440-746, KOREA; preprint also available at cond-mat@xxx.lanl.gov (#9810101). 74.25.Fy; 74.72.-h; 72.15.Jf; 72.10.Di.

J. L. Cohn, "Thermal Transport as a Probe of Localized Charge and Lattice Distortions in Manganites and Cuprates." Submitted to the Proc. of the Euroconf. on Polarons: Condensation, Pairing, Magnetism, Erice, Italy, June 9-17, 1998; to be published in J. Supercond. Department of Physics, University of Miami, Coral Gables, FL 33124; e-mail cohn@phyvax.ir.miami.edu; preprint also available at cond-mat@xxx.lanl.gov (#9810167). 74.72.-h; 74.25.Fy; 74.25.Bt; 74.25.Dw.

J. L. Cohn and J. Karpinski, "Anisotropic In-Plane Thermal Conductivity of Single-Crystal $YBa_2Cu_4O_8$." To be published in Phys. Rev. B. Department of Physics, University of Miami, Coral Gables, FL 33124; e-mail cohn@phyvax.ir.miami.edu; preprint also available at cond-mat@xxx.lanl.gov (#9810152). 74.72.-h; 74.25.Fy; 74.25.Kc; 74.25.Dw.

G. W. Crabtree, W. K. Kwok, U. Welp, D. Lopez, and J. A. Fendrich, "Vortex Melting and the Liquid State in

$YBa_2Cu_3O_X$." To be published in Proc. of the NATO Adv. Study Inst. – Phys. and Mater. Sci. of the Vortex States, Flux Pinning, and Dynamics, Kusadasi, Turkey, July 26-Aug. 8, 1998. Contact Janice Coble, Materials Science Division, Argonne National Laboratory, 9700 South Cass Avenue, Argonne, IL 60439; telephone (630) 252-5497; telefax (630) 252-9595; e-mail coble@anl.gov.

M. Crisan, C. P. Moca, and I. Tifrea, "Electron-Fluctuation Interaction in a Non-Fermi Superconductor." Submitted to Phys. Rev. B. Department of Theoretical Physics, University of Cluj, 3400 Cluj, ROMANIA; e-mail mcrisan@hera.ubbcluj.ro; preprint also available at cond-mat@xxx.lanl.gov (#9809152).

A. Das, M. R. Koblischka, N. Sakai, M. Muralidhar, S. Koishikawa, T. Fukuzaki, S. J. Seo, and M. Murakami, "Magnetic and Magneto-Optic Characterization of the Ternary Compounds *$(Nd_{0.33}Eu_{0.33}Gd_{0.33})Ba_2Cu_3O_y$*, *$(Sm_{0.33}Eu_{0.33}Gd_{0.33})Ba_2Cu_3O_y$* and *$(Nd_{0.33}Sm_{0.33}Gd_{0.33})Ba_2Cu_3O_y$*." To be published in Supercond. Sci. & Technol. Superconductivity Research Laboratory, International Superconductivity Technology Center (ISTEC), 1-16-25 Shibaura, Minato-Ku, Tokyo 105, JAPAN; M. Muralidhar's telephone +81 19 635-9015 or -9016; telefax +81 19 635-9017; e-mail miryala@istec.or.jp.

D. Djajaputra and J. Ruvalds, "Spin Susceptibility Divergence in High-Temperature Superconductors." Department of Physics, University of Virginia, Charlottesville, VA 22903; J. Ruvalds' telephone (804) 924-6796; telefax (804) 924-4576; e-mail jr7k@virginia.edu.

Patricia Dolez, Benoit des Ligneris, Marcel Aubin, Wen Zhu, and Julian Cave, "Effect of Combining a dc Bias Current with an ac Transport Current on ac Losses in a High Temperature Superconductor." Presented at the 1998 Appl. Supercond. Conf. (ASC), Palm Desert, Calif., Sept. 13-18, 1998. Contact Marcel Aubin, Department of Physics, Université de Sherbrooke, Sherbrooke, Québec, CANADA J1K 2R1; e-mail maubin@pauli.physique.usherb.ca.

S. X. Dou, R. Zeng, X. K. Fu, Y. C. Guo, B. Zeimetz, H. K. Liu, T. Beales, and M. Apperley, "Critical Role of Phase Transformation During Processing of *Ag/Bi:2223* Tapes." Institute for Superconducting and Electronic Materials, University of Wollongong, NSW 2522, AUSTRALIA; telephone +61 2 4221 5730; telefax +61 2 4221 5731; e-mail shi_dou@uow.edu.au.

Sasa Dukan and Oskar Vafek, "Anomalous Behavior of the Upper Critical Field in Extreme Type-II Superconductors at Low Temperatures." To be published in Physica C. Department of Physics and Astronomy, Goucher College, 1021 Dulaney Valley Road, Baltimore, MD 21204; telephone (410) 337-6323; telefax (410) 337-6408; e-mail sdukan@goucher.edu; preprint also available at cond-mat@xxx.lanl.gov (#9810304). Key words: upper critical field, Landau levels, low temperatures. 74.25.Dw; 74.60.-w.

Michael B. Field, Volker R. Todt, Dean J. Miller, and Dong Ho Kim, "The Effect of the Grain Boundary Plane on Transport Properties of Bulk Scale 90°[100] Grain Boundaries in *$YBa_2Cu_3O_{6+x}$*." Submitted to Appl. Phys. Lett. Contact Janice Coble, Materials Science Division, Argonne National Laboratory, 9700 South Cass Avenue, Argonne, IL 60439; telephone (630) 252-5497; telefax (630) 252-9595; e-mail coble@anl.gov or field@anl.gov.

P. Fournier, P. Mohanty, E. Maiser, S. Darzens, T. Venkatesan, C. J. Lobb, G. Czjzek, R. A. Webb, and R. L. Greene, "Insulator-Metal Crossover Near Optimal Doping in *$Pr_{2-x}Ce_xCuO_4$*: Anomalous Normal-State Low Temperature Resistivity." To be published in Phys. Rev. Lett. Center for Superconductivity Research, Department of Physics, University of Maryland, College Park, MD 20742; telephone (301) 405-5992 or -7943; telefax (301) 314-9541; e-mail pfournie@squid.umd.edu. 74.25.Fy; 71.10.Hf; 74.72.Jt.

Pijush K. Ghosh and Keshav N. Shrivastava, "Soft Vortices in Type-II Superconductors: *YNi_2B_2C* and *$ErNi_2B_2C$*." To be published in Physica C (in press). Contact Keshav N. Shrivastava, School of Physics, University of Hyderabad, P.O. Central University, Hyderabad 500 046, INDIA. Key words: borocarbides, structural phase transition, scaling.

D. Groten, E. Ardonne, S. Ramakrishnan, G. J. Nieuwenhuys, and J. A. Mydosh, "Influence of the Spin Susceptibility on the Peak Effect in *La*-Doped *$CeRu_2$*." To be published in Physica C (in press). Kamerlingh Onnes Laboratory, Leiden University, P.O. Box 9504, 2300 RA Leiden, THE NETHERLANDS; telefax +31 71 5275404; e-mail groten@rulkol.leidenuniv.nl. Key words: *$CeRu_2$*, magnetization, peak effect, rare-earth substitution, superconductivity. 74.25.Dw; 74.62.Dh; 74.70.Ad.

M. Hervieu, S. Malo, B. Raveau, C. W. Chu, Y. Y. Xue, and I. A. Rusakova, "A Layered Cuprate Derived from the Hexagonal 4H-*$BaCuO_{2+X}$* Structure: *$Ba_{36}Ca_2Cu_{32}O_{86-x}$*." Preprint #98:095; to be published in Physica C. Laboratoire de Cristallographie et Sciences des Matériaux, ISMRA, Université de Caen, Boulevard du Maréchal Juin, F-14050 Caen Cedex, FRANCE; preprint also available from Texas Center for Superconductivity, University of Houston, Houston, TX 77204-5932; telephone (713) 743-8200; telefax (713) 743-8201; e-mail preprints@www. tcs.uh.edu.

R. P. Huebener, S. Kaiser, and O. M. Stoll, "Electronic Vortex Structure and Flux-Flow Resistance Steps in the Cuprate Superconductor $Nd_{2-x}Ce_xCuO_y$." To be published in Europhys. Lett. Physikalisches Institut, Lehrstuhl für Experimentalphysik II, Universität Tübingen, Morgenstelle 14, D-72076 Tübingen, GERMANY; telephone +49 7071 2976315; telefax +49 7071 295406; e-mail prof.huebener@uni-tuebingen.de. 74.25.Fy; 74.60.Ge; 74.72.Jt.

H. Inada, T. Nakamura, and M. Iiyama, "Novel Contact Structure for Ultra Thin $YBa_2Cu_3O_{7-x}$ Films." To be published in Physica C (in press). Basic High-Technology Laboratories, Sumitomo Electric Industries, 1-1-3 Shimaya, Konohana-ku, Osaka 554, JAPAN; telephone +81 6 466 6502; telefax +81 6 464 3564. Key words: thin film, application of high-T_c superconductors, contact resistance.

M. Ionescu, B. Zeimetz, and S. X. Dou, "Microhardness Anisotropy of *Bi-2212* Crystals." To be published in Physica C (in press). Institute for Superconducting and Electronic Materials, University of Wollongong, NSW 2522, AUSTRALIA; e-mail mionescu@uow.edu.au. Key words: high-temperature superconductor, bismuth-based superconductors, *Bi-2212,* microhardness, anisotropy.

V. A. Ivanshin, M. R. Gafurov, I. N. Kurkin, S. P. Kurzin, A. Shengelaya, H. Keller, and M. Gutmann, "Electron Spin-Lattice Relaxation of Er^{3+} ions in $Y_{0.99}Er_{0.01}Ba_2Cu_3O_x$." To be published in Physica C (in press). MRS Laboratory, Kazan State University, Kremlevskaya str. 18, 420008 Kazan, RUSSIA; telephone +7 8432 315169; telefax +7 8432 387418; e-mail vladimir.ivanshin@ksu.ru. Key words: *YBCO,* ESR, electron spin-lattice relaxation time T_1, crystalline electric field.

L. Jansen and R. Block, "Effect of Uniaxial Stress on Critical Temperatures of Superconducting Cuprates: An Indirect-Exchange Approach." To be published in Physica A. Institut für Theoretische Physik, ETH-Hönggerberg, CH-8093 Zürich, SWITZERLAND; telefax +41 1 633 1115; e-mail jansen@itp.phys.ethz.ch.

M. Jirsa, M. R. Koblischka, T. Higuchi, and M. Murakami, "Effect of Twin Planes in the Magnetization Hysteresis Loops of $NdBa_2Cu_3O_7$ Single Crystals." To be published in Phys. Rev. B. Superconductivity Research Laboratory, International Superconductivity Technology Center (ISTEC), 1-16-25 Shibaura, Minato-ku, Tokyo 105, JAPAN; M. R. Koblischka's e-mail koblischka@istec.or.jp. 74.60.Ec; 74.60.Ge; 74.60.Jg.

A. R. Jurelo, I. Abrego Castillo, J. Roa-Rojas, L. M. Ferreira, L. Ghivelder, P. Pureur, and P. Rodrigues, Jr., "Coherence Transition in Granular High Temperature Superconductors." To be published in Physica C. Contact P. Pureur, Instituto de Física, Universidade Federal do Rio Grande do Sul, P.O. Box 15051, 91501-970 Porto Alegre, BRAZIL; telephone +55 51 316 6458; telefax +55 51 319 1762; e-mail ppureur@if.ufrgs.br. Key words: fluctuation conductivity, critical phenomena, granularity, high-temperature superconductivity. 74.40.+k; 74.25.Bt; 74.25.Fy; 74.72.Bk; 74.80.Bj.

N. Kakinuma, Y. Ono, and Y. Koike, "Anomalies of T_c, Resistivity and Thermoelectric Power in the Overdoped Region of $La_{2-x}Sr_xCu_{1-y}Zn_yO_4$." To be published in Phys. Rev. B. Contact Y. Koike, Department of Applied Physics, Graduate School of Engineering, Tohoku University, Aramaki Aoba 08, Aoba-ku, Sendai 980-8579, JAPAN; e-mail koike@teion.apph.tohoka.ac.jp.

Masaru Kato and Kazumi Maki, "Quasiparticle Spectrum Around a Single Vortex in s-Wave Superconductors." Department of Physics and Astronomy, University of Southern California, Los Angeles, CA 90089-0484; e-mail masaruk@physics1.usc.edu; preprint also available at cond-mat@xxx.lanl.gov (#9810187). 74.60.Ec; 74.20.Fg.

Neeraj Khare, A. K. Gupta, S. K. Shrivastava, H. K. Singh, and O. N. Srivastava, "Study of Harmonic Generation in *Hg(Tl)BaCaCuO* Thin Film." To be published in Physica C (in press). Contact A. K. Gupta, National Physical Laboratory, Dr. K. S. Krishnan Road, New Delhi-110012, INDIA. Key words: harmonic generation, *Hg(Tl)BaCaCuO,* high-T_c thin film.

Chan-Joong Kim, "Refinement of Y_2BaCuO_5 and Distribution of Microstructural Inhomogeneities in Melt-Processed *YBCO* Superconductors." To be published in Studies of High Temp. Supercond., Vol. 27-28, edited by A. Narlikar (Nova Science Publishers, New York, 1998). Superconductivity Research Laboratory, Korea Atomic Energy Research Institute, P.O. Box 105, Yusong, Taejon 305-600, SOUTH KOREA; telephone +82 42 868 8908; telefax +82 42 862 5496; e-mail cjkim2@nanum.kaeri.re.kr.

Michael R. Koblischka, Arabinda Das, Miryala Muralidhar, Naomichi Sakai, and Masato Murakami, "Field-Cooled Flux Distributions as Tool to Analyze Pinning Properties." To be published to Jpn. J. Appl. Phys. Superconductivity Research Laboratory, International Superconductivity Technology Center (ISTEC), 1-16-25 Shibaura, Minato-ku, Tokyo 105, JAPAN; e-mail koblischka@istec.or.jp. Key words: magneto-optic imaging, field cooling, flux distributions, flux pinning, melt-textured superconductors.

C. Kunugi, S. Kuwata, K. Tokiwa, A. Iyo, T. Watanabe, and H. Ihara, "Pressure Effect on T_c in $(B_{1-x}C_x)(Ba_{1-y}Sr_x)_2Ca_2Cu_3O_z$ (x = 0.3, y = 0.25; x = 0.35, y = 0.3) and $B_{0.8}C_{0.2}(Ba_{0.75}Sr_{0.25})_2Ca_3Cu_4O_z$." To be published in Physica C (in press). Contact T. Watanabe, Department

of Applied Electronics, Science University of Tokyo, 2641 Yamazaki, Noda-shi, Chiba 278-8510, JAPAN; telephone +81 471 24 1501, ext. 4204; telefax +81 471 22 9195; e-mail watanabe@te.noda.sut.ac.jp. Key words: pressure effects, oxycarbonate superconductors, high-T_c superconductivity.

X. L. Ma, T. Hirayama, K. Yamagiwa, I. Hirabayashi, and Y. Ikuhara, "Microstructure Characterization of $YBa_2Cu_3O_{7-y}$ Thin Film Derived from the Metal *(Y, Ba,* and *Cu)* Naphthenates Gels Coated on the $SrTiO_3$ (100) Substrate." To be published in Physica C (in press). Japan Fine Ceramics Center, 2-4-1 Mutsuno, Atsuta-ku, Nagoya 456, JAPAN; telephone +81 52 871 3500; telefax +81 52 87 1 3599; e-mail ma@jfcc.or.jp. Key words: $YBa_2Cu_3O_{7-y}$ thin film, metal naphthenates gels, $SrTiO_3$ (100) substrate.

N. Mason and A. Kapitulnik, "Dissipation Effects on the Superconductor-Insulator Transition in 2-D Superconductors." Department of Applied Physics, E. L. Ginzton Laboratory, Box S-61, Stanford University, Stanford, CA 94305; A. Kapitulnik's e-mail ak@loki.stanford.edu; preprint also available at cond-mat@xxx.lanl.gov (#9810228). 74.25.Fy; 74.62.Dh; 74.25.Bt; 74.72.Hs.

Q. B. Meng, Z. J. Wu, and S. Y. Zhang, "Investigation of *Pr* Valence and Relationship Between Bond Covalency and T_c in $Y_{1-x}Pr_xBa_2Cu_3O_7$ (x = 0-1)." To be published in Physica C (in press). Contact Z. J. Wu, Laboratory of Rare Earth Inorganic Materials, Changchun Institute of Applied Chemistry, Chinese Academy of Sciences, Changchun 130022, PEOPLE'S REPUBLIC OF CHINA; telefax +86 431 568 5653; e-mail zjwu@ns.ciac.jl.cn. Key words: *Pr* valence, bond covalency, T_c.

A. Mourachkine, "The Origin of the Pseudogap from Tunneling Spectroscopy Measurements on $Bi_2Sr_2CaCu_2O_{8-x}$ Single Crystals." Submitted to Phys. Rev. Lett. Service Physique des Solides, Université Libre de Bruxelles, CP233, Boulevard du Triomphe, B-1050 Brussels, BELGIUM; telephone +32 2 650 5758; telefax +32 2 650 5916; e-mail anmourac@ulb.ac.be; preprint also available at cond-mat@xxx.lanl.gov (#9810161). 74.50.+r; 74.25.-q; 74.72.Hs; 74.62.Dh.

Masaki Oshikawa and Alexandre M. Zagoskin, "Voltage Fluctuations on a Superconductor Grain Attached to a Quantum Wire." Department of Physics, Tokyo Institute of Technology, Oh-Okayama, Meguro, Tokyo 152-8511, JAPAN; Alexandre M. Zagoskin's e-mail at University of British Columbia zagoskin@theory.physics.ubc.ca; preprint also available at cond-mat@xxx.lanl.gov (#9810303).

Stellan Östlund, "Landau Ginzburg Theory of the d-Wave Josephson Junction." Preprint #ITP 98-10. Institute of Theoretical Physics, Chalmers University of Technology, S-41296 Göteborg, SWEDEN; e-mail ostlund@fy.chalmers.se; preprint also available at cond-mat@xxx.lanl.gov (#9810084). 74.50.+r; 74.76.Bz; 74.80.Fp; 74.20.De.

C.-H. Pao and H.-B. Schüttler, "Numerical Renormalization Group Approach to Fluctuation Exchange in the Presence of Electron-Phonon Coupling: Pairing in the Holstein-Hubbard Model." Department of Physics, National Chung Cheng University, Chia-Yi, Taiwan, REPUBLIC OF CHINA; H.-B. Schüttler's e-mail at University of Georgia hbs@hal.physast.uga.edu; preprint also available at cond-mat@xxx.lanl.gov (#9809321).

J.-H. Park, K. C. Goretta, and Norimitsu Murayama, "Chemical Diffusion of Oxygen in Dense, Textured $(Bi,Pb)_2Sr_2Ca_2Cu_3O_x$." Submitted to Physica C. Contact Janice Coble, Materials Science Division, Argonne National Laboratory, 9700 South Cass Avenue, Argonne, IL 60439; telephone (630) 252-5497; telefax (630) 252-9595; e-mail coble@anl.gov.

J. S. Penttilä, Ü. Parts, P. J. Hakonen, M. A. Paalanen, and E. B. Sonin, "'Superconductor-Insulator Transition' in a Single Josephson Junction." Low Temperature Laboratory, Helsinki University of Technology, FIN-02015 Espoo, FINLAND; e-mail jpenttil@boojum.hut.fi; preprint also available at cond-mat@xxx.lanl.gov (#9809307). 74.50.+r; 73.23.-b; 73.23.Hk.

M. Polichetti, F. Gömöry, and S. Pace, "Possible Frequency Dependence of the Surface Barrier in High-T_c Superconducting Grains." To be published in Phys. Lett. A. Department of Physics, University of Salerno, INFM, Via S. Allende, I-84081 Baronissi, Salerno, ITALY; telephone +390 89-965 360 or -965 277; telefax +390 89-953 804; e-mail polimax@vaxsa.csied.unisa.it or polimax@pclab.phys.unisa.it. Key words: ac susceptibility of superconductors, mixed state, surface pinning, granular superconductivity. 74.25.Ha; 74.60.Ec; 74.80.Bj.

V. Prokic, A. I. Buzdin, and L. Dobrosavljevic-Grujic, "Theory of π-Junctions Formed in Atomic Scale Superconductor/Ferromagnet Superlattices." To be published in Phys. Rev. B. Institute of Physics, University of Belgrade, P.O. Box 368, 11001 Belgrade, YUGOSLAVIA; telephone +381 11 3160 260; telefax +381 11 3162 190; e-mail prokic@phy.bg.ac.yu. 74.50.+r; 74.80.Dm.

Sandeep Rekhi, G. L. Bhalla, and G. C. Trigunayat, "Recovery of Superconductivity in the Water Degraded *YBCO* Samples." To be published in Physica C (in press). Department of Earth Sciences, Mineralogy-Petrology, Villavagen 16, 752 36 Uppsala, SWEDEN; telephone +46 18 471 2587; telefax +46 18 471 2591; e-mail

sandeeprekhi@hotmail.com. Key words: superconductivity, *YBCO* samples, heat treatments.

Jörg Schmalian, "Quantum Critical Point with Competing Propagating and Diffusive Spin Excitations." Loomis Laboratory of Physics, University of Illinois at Urbana-Champaign, 1110 W. Green Street, Urbana, IL 61801; telephone (217) 333-4440; telefax (217) 244-7559; e-mail schmal@physics.uiuc.edu.; preprint also available at cond-mat@xxx.lanl.gov (#9810041).

Fajian Shi, "The Possibility of Two-Exciton Pairing in Singlet and in Triplet States." Material Sciences Division, Lawrence Berkeley Laboratory, 1 Cyclotron Road, Berkeley, CA 94720; telephone (510) 486-4828; telefax (510) 486-4995; e-mail shifj@electron.lbl.gov; preprint also available at cond-mat@xxx.lanl.gov (#9810127). 74.20.Mn; 74.25.-q.

M. D. Sumption, S. Takács, and E. W. Collings, "Modeling of M-H Loop Anomalies in Synergistically Pinned, Heterogenous, Composite Superconductors." To be published in Physica C (in press). Department of Materials Science and Engineering, 477 Watts Hall, Ohio State University, 2041 College Avenue, Columbus, OH 43210-1179; telephone (614) 688-3684; telefax (614) 292-3677; e-mail mdsumption+@osu.edu. Key words: low-field anomaly, *NbTi* filaments, composite superconductors, superconducting elements, magnetization.

Takuya Suzuki, Ken-ichi Yumoto, Mikito Mamiya, Masashi Hasegawa, and Humihiko Takei, "Phase Relation Studies on the $(Bi_{0.8}Pb_{0.2})_2Sr_2CuO_6$-$CaCuO_2$ System Between 850 and 1020°C." To be published in Physica C (in press). Japan Synchrotron Radiation Research Institute, 323-3 Mikaduki, Sayo, Hyogo 679-5198, JAPAN; telephone +81 7915 8 2742; telefax +81 7915 8 0830; e-mail stakuya@ sping8.or.jp. Key words: $(Bi_{0.8}Pb_{0.2})_2Sr_2CuO_6$-$CaCuO_2$, phase relations, superconductive transition temperature.

I. Tifrea, I. Grosu, and M. Crisan, "Fluctuation Contribution to the Specific Heat in Non-Fermi Models for Superconductivity." Submitted to Phys. Rev. B. Department of Theoretical Physics, University of Cluj, 3400 Cluj, ROMANIA; e-mail tifrea@hera.ubbcluj.ro; preprint also available at cond-mat@xxx.lanl.gov (#9810034).

J. M. Tranquada, N. Ichikawa, and S. Uchida, "Glassy Nature of Stripe Ordering in $La_{1.6-x}Nd_{0.4}Sr_xCuO_4$." Submitted by Phys. Rev. B. Department of Physics, Brookhaven National Laboratory, Upton, NY 11973-5000; e-mail jtran@bnl.gov; preprint also available at cond-mat@xxx.lanl.gov (#9810212). 75.50.Ee; 75.30.Fv; 71.45.Lr; 71.27.+a.

I-Fei Tsu, Jyh-Lih Wang, D. L. Kaiser, and S. E. Babcock, "A Comparison of Grain Boundary Topography and Dislocation Network Structure in Bulk-Scale [001] Tilt Bicrystals of $Bi_2Sr_2CaCu_2O_{8+x}$ and $YBa_2Cu_3O_{7-\delta}$." To be published in Physica C (in press). Contact S. E. Babcock, Materials Science and Engineering and Applied Superconductivity Center, University of Wisconsin-Madison, 1500 Engineering Drive, Madison, WI 53706; telephone (608) 263-5696; telefax (608) 263-1087; e-mail babcock@ engr.wisc.edu. Key words: bicrystals, grain boundaries, $YBa_2Cu_3O_{7-\delta}$, $Bi_2Sr_2Ca_1Cu_2O_{8+x}$, facets, dislocations. 81.90.+c.

Tetsuo Tsuchiya, Kazuo Fueki, and Shinzi Maekawa, "Determination of Fermi Level of $Bi_2Sr_2(Y_{1-x}Ca_x)Cu_2O_y$ as a Function of Calcium and Oxygen Contents by Electrochemical Method." To be published in Physica C (in press). Department of Industrial Chemistry, Faculty of Science and Technology, Science University of Tokyo, 2641 Yamazaki, Noda-shi, Chiba 278, JAPAN; telephone +81 471 241501; telefax +81 471 239890; e-mail tsuchiya@ nimc.go.jp. Key words: Fermi level, electrochemical method, $Bi_2Sr_2(Y_{1-x}Ca_x)Cu_2O_y$, electronic structure.

M. K. Van Bael, A. Kareiva, G. Vanhoyland, J. D'Haen, M. D'Olieslaeger, D. Franco, C. Quaeyhaegens, J. Yperman, J. Mullens, and L. C. Van Poucke, "Enhancement of T_c by Substituting Strontium for Barium in the $YBa_2Cu_4O_8$ Superconductor Prepared by a Sol-Gel Method." To be published in Physica C (in press). Laboratory of Inorganic and Physical Chemistry, IMO, Limburgs Universitair Centrum, B-3590 Diepenbeek, BELGIUM; telephone +32 11 268393; telefax +32 11 268301; e-mail mvanbael@luc.ac.be. Key words: synthesis of $Y(Ba_{1-x}Sr_x)_2Cu_4O_y$, substitution effects, electrical resistivity.

Xinggong Wan, Yuping Sun, Wenhai Song, Kaiyou Wang, Liudi Jiang, and Jiaju Du, "Enhanced Flux Pinning of *Bi-2223/Ag* Tapes with Nano-*MgO* Particles Addition." To be published in Physica C (in press). Institute of Solid State Physics, Academia Sinica, P.O. Box 1129, Hefei 230031, PEOPLE'S REPUBLIC OF CHINA. Key words: flux pinning, *Bi-2223/Ag* tapes, nano-*MgO* particles.

Guangfeng Wang and Kazumi Maki, "Low Temperature Properties of the Vortex State in d-Wave Superconductor." Department of Physics and Astronomy, University of Southern California, Los Angeles, CA 90089-0484. 74.20.Fg; 74.25.Bt; 74.72.-h.

H. Won, K. Maki, and E. Puchkaryov, "Introduction to d-Wave Superconductivity." Presented at the NATO Adv. Study Inst.–Mater. Sci., Fundamental Properties and Future Electronic Applications of High-T_c Supercond., Albena, Bulgaria, Sept. 14-25, 1998. Department of

Physics and IRC, Hallym University, Chunchon 200-702, SOUTH KOREA.

H. Wu and S. S. Wang, "Flux Pinning Mechanism for *Nd-Ba-Cu-O* Superconductor." Preprint #98:096; submitted to IEEE Trans. Appl. Supercond.: Proc. of the 1998 Appl. Supercond. Conf. (ASC), Palm Desert, Calif., Sept. 13-18, 1998. Texas Center for Superconductivity, University of Houston, Houston, TX 77204-5932; telephone (713) 743-8200; telefax (713) 743-8201; e-mail preprints@www.tcs.uh.edu.

Chau-Yun Yang, S. E. Babcock, A. Goyal, M. Paranthaman, F. A. List, D. P. Norton, D. M. Kroeger, and A. Ichinose, "Microstructure of Electron-Beam-Evaporated Epitaxial Yttria-Stabilized Zirconia/ CeO_2 Bilayers on Biaxially Textured *Ni* Tape." To be published in Physica C (in press). Contact S. E. Babcock, Materials Science and Engineering and Applied Superconductivity Center, University of Wisconsin-Madison, 1500 Engineering Drive, Madison, WI 53706; telephone (608) 263-5696; telefax (608) 263-1087; e-mail babcock@engr.wisc.edu. Key words: coated conductors, RABiTS™, biaxial texture, buffer layers, *YSZ,* CeO_2*,* $YBa_2Cu_3O_{7-\delta}$.

J. H. Yu, Y. Postrekhin, K. B. Ma, W. K. Chu, and T. L. Wilson, "Vibration Isolation for Space Structures Using HTS-Magnet Interaction." Preprint #98:094; submitted to IEEE Trans. Appl. Supercond.: Proc. of the 1998 Appl. Supercond. Conf. (ASC), Palm Desert, Calif., Sept. 13-18, 1998. Texas Center for Superconductivity, University of Houston, Houston, TX 77204-5932; telephone (713) 743-8200; telefax (713) 743-8201; e-mail preprints@www.tcs.uh.edu.

Yabin Yu, Guanghan Cao, and Zhengkuan Jiao, "Superexchange in the Cuprates: A Mean-Field Study." To be published in Physica C (in press). Department of Physics, Zhejiang University, Hangzhou 310027, PEOPLE'S REPUBLIC OF CHINA. Key words: copper, oxygen, Hubbard Halmitonian.

R. Zeng, B. Ye, J. Horvat, Y. C. Guo, B. Zeimetz, X. F. Yang, T. P. Beales, H. K. Liu, and S. X. Dou, "Grain Connectivity and Flux Pinning in *Bi-2223/Ag* PIT Tapes." To be published in Physica C (in press). Center for Superconducting and Electronic Materials, University of Wollongong, Wollongong NSW 2522, AUSTRALIA; telefax +61 42 215731; e-mail rong@uow.edu.au. Key words: *Bi-2223* tapes, flux pinning, weak links, hot-pressing.

J. Zhong and H.-B. Schüttler, "Quasi-Particle Dynamics of a Strongly Correlated Polaron Metal." Submitted to Phys. Rev. B. Center for Simulational Physics, Department of Physics and Astronomy, University of Georgia, Athens, GA 30602; H.-B. Schüttler's e-mail hbs@hal.physast.uga.edu; preprint also available at cond-mat@xxx.lanl.gov (#9809383). 74.20.-z; 75.10.-b; 63.20.Kr; 71.30.+h; 71.45.Lr.

J. S. Zhou and J. B. Goodenough, "Structural Sensitivity of Transport Properties of the High-T_c Cuprates." Preprint #98:099; submitted to the Proc. of the Second Polish-US Conf. on High-Temp. Supercond., Karpacz, Poland, Aug. 17-21, 1998; to be published in Lecture Notes in Physics (Springer Verlag, Berlin, 1999). Texas Center for Superconductivity, University of Houston, Houston, TX 77204-5932; telephone (713) 743-8200; telefax (713) 743-8201; e-mail preprints@www.tcs.uh.edu.

J. S. Zhou, J. B. Goodenough, H. Sato, and M. Naito, "Optimal Superconductivity in $La_{2-x}Sr_xCuO_4$." Preprint #98:098; submitted to Phys. Rev. B. Texas Center for Superconductivity, University of Houston, Houston, TX 77204-5932; telephone (713) 743-8200; telefax (713) 743-8201; e-mail preprints@www.tcs.uh.edu. 74.25.Fy; 72.15.Jf.

J. X. Zhu and C. S. Ting, "Spontaneous Flux in a d-Wave Superconductor with Time-Reversal-Symmetry-Broken Pairing State at {110} Boundaries." Department of Physics and Texas Center for Superconductivity, University of Houston, Houston, TX 77204-4792; telephone (713) 743-8200; telefax (713) 743-8201; e-mail jxzhu@mira.tcs.uh.edu; preprint also available at cond-mat@xxx.lanl.gov (#9810205). 74.20.-z; 74.25.Jb; 74.50.+r.

Y. T. Zhu, P. S. Baldonado, J. F. Bingert, T. G. Holesinger, J. O. Willis, and D. E. Peterson, "Compressive Anneal Processing (CAP) of *Bi2223* Superconducting Tapes." Submitted to Physica C. Materials Science and Technology Division, Mail Stop G755, Los Alamos National Laboratory, Los Alamos, NM 87545; telephone (505) 667-4029; telefax (505) 667-2264; e-mail yzhu@lanl.gov.

A. R. Zomorrodian, N. J. Wu, H. Lin, and A. Ignatiev, "The Role of As-Grown Defects and Electrode Materials on Polarization Orientation of $Pb(Zr_{0.52}Ti_{0.48})O_3$ on $YBa_2Cu_3O_{7-x}$." Preprint #98:091; to be published in Thin Solid Films. Department of Physics, Faculty of Sciences, University of Ferdowsi in Mashhad, Mashhad 91735-654, IRAN; telephone +98 51 832021; telefax +98 51 838032; e-mail alizom@science1.um.ac.ir; preprint also available from Texas Center for Superconductivity, University of Houston, Houston, TX 77204-5932; telephone (713) 743-8200; telefax (713) 743-8201; e-mail preprints@www.tcs.uh.edu. Key words: polarization, *PZT,* electrode.

A. B. Zorin, Yua Pashkin, V. A. Krupenin and H. Scherer, "Coulomb Blockade Electrometer Based on Single Cooper Pair Tunneling." To be published in Appl. Supercond.

(in press). Physikalisch-Technische Bundesanstalt, Bundesallee 100, D-38116 Braunschweig, GERMANY.

COMING EVENTS

*(An * indicates a previously listed event.)*

March 8 - 26, 1999: Third Workshop

on Thin Film Physics and Technology. Includes Topical Conference on Microstructure and Surface Morphology Evolution in Thin Films (March 24 - 26, 1999), The Abdus Salam International Centre for Theoretical Physics (ICTP), Trieste, Italy. The aim of this workshop is to provide up-to-date overviews on general topics related to thin films science and technology and give information on selected topics which are expected to have a large impact on future applications. Content of the workshop will be focused on the problems of structure evolution of single and multi-component films, structure-property relationships, and problems of application of thin films in various fields. Results of experiments, simulation, and modeling will be reviewed. Adequate time will be reserved for informal discussions; participants are strongly encouraged to present seminars and/or posters on their home activities. Topics will include: mechanisms of microstructural evolution in thin films; experimental, simulation, and modeling; surface roughening and smoothening mechanisms during thin film growth: theory and experiment; thin films used in magnetic, optical, and magneto-optical recording; thin films in solar energy; thin films in optics; ferroelectric thin films; and surface analytical techniques used for thin-film characterization. Workshop language is English. Open to researchers from all countries that are members of the United Nations, UNESCO, or IAEA. No registration fee. **Deadline for participation request, November 30, 1998.** For information, contact the Abdus Salam International Centre for Theoretical Physics (SMR.1135), P.O. Box 586, I-34100 Trieste, Italy; telephone +39 40 2240111; telefax +39 40 224163; e-mail smr1135@ictp.trieste.it; Web site http://www.ictp.trieste.it/.

June 6 - 9, 1999: 1999 High Speed

Ground Transportation Association (HSGTA) Annual Conference, Westin Seattle, Seattle, Washington. For information, contact HSGTA, 1010 Massachusetts Ave., N.W. Suite 110, Washington, DC 20001; telephone (202) 789-8107; telefax (202) 789-8109.

*July 11 - 12, 1999: 16th Space

Cryogenics Workshop, Quebec City, Canada. Theme will be “Cryogenics for Space Exploration in the Next Millennium,” with a focus on the particular technological challenges related to long-term space exploration missions. (This workshop precedes the CEC/ICMC’99 Conference in Montreal.) For information, contact Louis J. Salerno, Chair, 1999 Space Research Workshop, NASA Ames Research Center, Mail Stop 234-1, Moffett Field, CA 94035-1000; telephone (650) 604-3189; telefax (650) 604-0487; e-mail lsalerno@mail.arc.nasa.gov.

*July 12 - 16, 1999: Cryogenic

Engineering Conference & International Cryogenic Materials Conference (CEC/ICMC), Hotel Inter-Continental Montreal, Montreal, Quebec, Canada. The CEC focuses on the science and engineering required for cryogenic applications such as liquefied gases for fuels; space applications of cryogenic liquids; cooling and performance of superconducting magnet systems in medical, transportation, power, and basic research applications; as well as the systems, machinery, control technology, and thermodynamics required to produce low temperatures. The ICMC focuses on the development, characterization, fabrication, and optimization of the materials used in cryogenic applications, typically broken into two broad categories: structural materials and superconducting materials. ICMC contributions cover both high- and low-temperature superconducting materials from basic materials research through behavior of composite cables and wires in applications. Cryogenic structural materials cover a broad range, including nonmetallic composites, polymeric resins and insulation materials, ferrous alloys, nickel-base alloys, aluminum alloys, and specialized materials for advanced cryocooler applications. **Abstract deadline, November 1, 1998 (for mailed submissions) and December 11, 1998 (for Web submissions).** For information, contact Centennial Conferences, 4800 Baseline Road, Suite A-112, Boulder, CO 80303; telephone (303) 499-2299; telefax (303) 499-2599; e-mail centennial@orci.com; Web site http://www.cec-icmc.org.

*July 28 - Aug. 2, 1999: International

Conference on Physics and Chemistry of Molecular and Oxide Superconductors (MOS99), Stockholm, Sweden. Satellite to the LT-22 Conference in Helsinki, Finland (Aug. 4 - 11, 1999). Contributions within all aspects of the physics and chemistry of molecular and oxide superconductors will be welcome, including: electronic properties, theory, optical properties, lattice dynamics, phonons, electrical properties, thermal properties, critical currents, vortex structure and dynamics, Josephson effects, thin films, material properties, borocarbides, ruthenides, fullerenes, organic superconductors, new superconducting materials, and applications. **Abstract deadline, March 1, 1999.** For information, contact Conference Service Bureau, Congrex Sweden AB, Attn. MOS 99, P.O. Box 5619, SE-114 86 Stockholm, Sweden; telephone +46 8 459 6600; telefax +46 8 661 9125; e-mail mos99@congrex.se; Web site http://www. mos99.kth.se.

*Aug. 4 - 11, 1999: 22nd International

Conference on Low Temperature Physics (LT22), Espoo and Helsinki, Finland. Topics will include: quantum gases,

fluids and solids; superconductivity; magnetism and lattice properties; quantum electron transport; applications; materials; and techniques. For information, contact Conference Service Bureau, TSG-Congress Ltd., Kaisaniemenkatu 3 B 31, FIN-00100 Helsinki, Finland; telephone +358 9 628044; telefax +358 9 667675; e-mail info@tsgcongress.fi. For technical information, contact the LT22 Office, Low Temperature Laboratory, Helsinki University of Technology, P.O. Box 2200, FIN-02015 HUT; telephone +358 9 451 2962; telefax +358 9 451 2969; e-mail info@ LT22.hut.fi; Web site http://lt22.hut.fi/LT22/LT22.html.

Aug. 29 - Sept. 10, 1999:* NATO Advanced Study Institute (ASI) on Microwave Superconductivity, The Pyrenees Mountains, Spain. This ASI will cover microwave properties of superconductors, the fabrication and measurement of superconducting devices, circuits which operate at microwave frequencies, and technological issues and market potential of all current and emerging microwave applications. Financial awards are available to some students and recent Ph.D.s who are residents of NATO and selected Eastern European countries. Directors: Martin Nisenoff, NRL and Harold Weinstock, AFOSR. **Application deadline, January 15, 1999. For application visit Web site www.geocities.com/Pentagon/Quarters/9088 or contact Sandy Ronayne, 110 Duncan Ave., Bolling AFB, DC 20332-8050; e-mail sandy.ronayne@ afosr.af.mil.

Sept. 14 - 17, 1999:* Fourth European Conference on Applied Superconductivity (EUCAS'99), Melia Gran Sitges, Hotel in Sitges, Barcelona, Catalonia, Spain. Aim is to provide a forum for presentation and discussion of the developments in the field of the applications of superconductivity, in both large and small scale, including the most recent advances in the subject. All aspects of applied superconductivity will be covered, from both a scientific point of view (which include contributions from the fields of physics, electronics, material properties, chemistry, and engineering), and also an industrial perspective. Conference will encourage new cooperation on European and wider international levels. The program will be divided into two main sections. Large Scale & Power Applications will include fusion and SMES, detectors and accelerators, fault current limiters, motors and generators, high magnetic fields, wires and cables, materials related to large-scale applications, system aspects, and other applications. Small Scale & Electronic Applications will include Josephson Junctions, SQUIDs, digital applications, mixers/detectors, passive devices, oscillators and volt standards, materials related to superconducting electronics, system aspects, and other applications. **Abstract deadline, March 15, 1999. For further information, contact Xavier Obradors, Institut de Ciencia de Materials de Barcelona (ICMAB-CSIC), Campus de la UAB, E-08193 Bellaterra (Barcelona), Catalonia, Spain; phone +34 93 580 18 53; fax +34 93 580 57 29; e-mail eucas99@icmab.es; Web site http://www.icmab.es/eucas99.

RESOURCES

Information

New Book: *Microstructures and Structural Defects in High-Temperature Superconductors,* by Zhi-Xiong Cai & Yimei Zhu. Book provides an extensive introduction to the microstructures and structural defects in high-temperature superconductors and illustrates the application of modern experimental techniques and theoretical modeling tools in the study of these complex materials. Provides overview of structure-sensitive properties such as transport, and discusses current effort to develop large-scale (high-current, high-field) applications for these materials. Effects of defects on the superconducting properties of these materials are described. Contents: defects and superconductivity, tools used to study the defects, structure characteristics, types of defects, defects in $YBa_2Cu_3O_7$, twin boundary structure in $YBa_2Cu_3O_{7-\delta}$, structural modulation in $La_{2-x}Ba_xCuO_4$, microstructure of *Bi-2212* and *Bi-2223,* charge distribution, structure of grain boundary, and artificially created defects. Readership: graduate students and researchers in materials science, condensed-matter physics, and chemistry. Publ. 1998; 400 pp.; price $68; ISBN 981-02-3285-3. Contact World Scientific Publishing Co. Inc., 1060 Main St., River Edge, NJ 07661; telephone (800) 227-7562 or (201) 487-9655; telefax (201) 487-9656. In Europe, World Scientific Publishing Co. Ltd., 57 Shelton Street, Covent Garden, London WC2 9HE, UK; telephone +44 171 836 0888; telefax +44 171 836 2020. In Asia, World Scientific Publishing Co. Pte. Ltd., Farrer Road, P.O. Box 128, Singapore 9128; telephone +65 3825663; telefax +65 3825919; e-mail sales@wspc.com.sg. Information also available at the Web site http://www.wspc.com.sg/.

FYI

(High-T_c Update takes no responsibility for want ads listed in this section.)

Reade Advanced Materials (READE) announces the vast expansion of its Web site to a 600-page award-winning, multilingual, and interactive supersite. Provides technical data and safety information on the 600 high-technology specialty chemical powders offered by READE. Summary list includes Material Safety Data Sheet library, online science & technology discount bookstore, 500 powerful resource links, useful particle briefings including powder sieve charts, magnetic, thermal, and electrical conductivity properties, density, specific gravity, surface area, and useful safety information toward inorganic powders. Also includes many educational briefings on the nanotechnology world of molecules and Angstroms. The READE Web site is located at http://www.reade.com.

AMES LABORATORY

Dr. Sreeparna Mitra
A219 Physics
Ames Laboratory
Iowa State University
Ames, Iowa 50011-3020

ADDRESS CORRECTION REQUESTED

High-T_c Update is published for the Office of Basic Energy Sciences, U.S. Department of Energy, under Contract W-7405-eng-82 with the Ames Laboratory, Iowa State University. Support is also provided by organizations listed on the masthead and by other donors. Please direct all inquiries to:

Dr. Sreeparna Mitra
A219 Physics
Ames Laboratory
Iowa State University
Ames, Iowa 50011-3020
Telephone: (515) 294-3877
Telefax: (515) 294-1134
E-mail: MITRA@AMESLAB.GOV
MITRA@IASTATE.EDU

Project Director and Editor: Sreeparna Mitra
Science Editor: John R. Clem
ISSN 1048-1141
Homepage: http://www.iitap.iastate.edu/htcu/htcu.html

High-T_c Update is the high-T_c superconductivity information exchange newsletter. It is available twice-monthly as hard copy and as electronic mail. Please send: 1) preprints, reprints, and other T_c-related reports or publications; 2) descriptions of on-going work; 3) meeting news; and 4) etc. Information in *High-T_c Update* is intended for limited distribution. Readers are expected to respect the rights of authors.