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Chapter 1 : superconductors - [PDF Document]

*Internal Friction and Ultrasonic Attenuations in Solids Including High Tc Superconductors: Proceedings of the Sixth European Conference Academy of (Materials Science Forum) [L. B. Magalas, S. Gorczyca] on calendrierdelascience.com *FREE* shipping on qualifying offers.*

Linsen Yang zyxwvutsrqp zyxwv zyxwvuts S. The results show ultrasonic attenuation peaks, lattice parameter stepping, and X-ray diffraction intensity weakening in the two temperature ranges, to and to K. These anomalous phenomena are caused by lattice instabilities. By these techniques, many studies on the elastic behaviour of high-T, superconductors have been carried out [l to 31, and the results have shown that elastic anomalies which correspond to lattice instabilities always appear in the temperature ranges of to and to K. In these two temperature ranges peaks of internal friction and ultrasonic attenuation, ferroelastic loops, elastic softening are observed sometimes together with shape memory effects [4 to Corresponding to these anomalies, X-ray diffraction experiments have also shown a small stepping of the lattice parameters but without change of the structural symmetry [l, These lattice instabilities are attributed to phase-like transitions PLTs [4] or subtle structure changes [S]. However, the investigations of thallium oxide superconductors have not been so extensive and their PLT behaviour needs further exploring. In the present paper, we use the methods of ultrasonic attenuation and X-ray diffraction to investigate the property of the lattice instability of Tl,Ba,Ca,Cu,O, 2. The result shows that the sample consists mainly of the phase. The plane spacings of , , , , ; , loll , , 1 , , and were calibrated by the line of Si. The lattice parameters, Q and c, were obtained from fitting these data by a least-squares method. The diffraction zyxwvuts integrated intensities of and were measured three times, and the deviation from the mean intensity is smaller than 0. For the ultrasonic attenuation measurements, the ceramic sample, joining up with the quartz transducers by Nonaq stopcock grease, has a diameter of 1. Ultrasonic attenuation of the longitudinal wave was measured at 6. They reveal TI and T2 peaks located at zyxwvuts about and K, respectively. The peak temperatures measured at different frequencies ,f are obviously not modified. The ratios of the peak heights at 6. These results which are listed on Table 1 in detail confirm that these peaks are due to a phase-like transition instead of a relaxation. As a result of phase-like transition, the lattice parameters Q and c exhibit stepping changes in the ranges to and to K as shown in Fig. The stepping amplitudes are 0. The ultrasonic attenuation a vs. The ultrasonic attenuation T2 peaks Table 1 a 5. Temperature dependence of X-ray diffraction intensity of a and b plane for TI,Ba,Ca,Cu,O, Otherwise, the X-ray diffraction intensities of and planes display anomalies in the two temperature ranges, to and to K, as shown in Fig. According to the Debye-Waller theory, during cooling the weakening of the diffraction intensity implies that amplitudes of the lattice vibration increase and the interactions between atoms reduce. It indicates the softening of lattice vibration in these anomaly ranges, which results in a static structural distortion. The nature of these anomalies as mentioned above reflects the presence of lattice instabilities in T1,Ba,Ca2Cu,0, There have been sever3 indications for the presence of these lattice instabilities or elastic softening in these cuprate superconductors [9 to , and the shear type character was confirmed [4, 71 by the ferroelastic behaviour and shape memory effect appearing around the lattice instability temperatures for all three kinds of cuprate superconductors [6]. So the elastic anomalies in the temperature ranges of to and to K may be related to the softening ofthe shear modes in TI,Ba,Ca,Cu,O, In addition, the ultrasonic attenuation, a, exhibits a remarkable plateau above T, and drops rapidly at temperatures just below T, with an apparent turning point located at T, for Tl,Ba,Ca,Cu,O, as shown in Fig. This result, which can be explained using a coupling model of carriers with the local dynamic distortion because of high- T, superconductors being strong-correlation systems, has been discussed in another paper [In summary, the measurements of the ultrasonic attenuation and X-ray diffraction show zyxwvutsrqponmlkjihgfed anomalous phenomena in the temperature ranges of to and to K, which zyxwvuts are attributed to lattice instabilities. References [I] Y. Wu, Phase Transitions 22, 9 C 20, L Letters B 3, Letters A , B 38, Letters 65, B 39, B 42, [12] B. Letters 61, B 47, zy

Chapter 2 : Cordero Francesco - Istituto dei Sistemi Complessi CNR

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This kind of anomaly has not been observed for nonsuperconducting samples. The results of ultrasonic attenuation 0. These results indicate that the drastic drop of Q and a below T, is caused by superconducting condensation. So ultrasonic mea- surements can be used to determine the energy gap and offer an additional verification of the mechanism of su- perconductivity. These results are similar to those measured in the MHz range by Saint-Paul et al. Four kinds of Bi-Sr-Ca-Cu-0 ceramic samples were used in our experiments of internal friction. The first Bi-I is mainly 2: Two kinds of Tl-Ba-Ca-Cu-0 ceramic samples were used. The first Tl-I used in the measurements of internal friction is mainly 2: The dimensions of all the samples used in the measure- ments of internal friction are about 40X4X0. The cooling or heating rate is 0. Moreover, there are two turning points for the second kind of Bi-Sr-Ca-Cu-0 Bi-II with one at K and another around 88 K, which correspond to the two critical temperatures. The results for the samples during heating are almost coincident with those during cooling, and the data for successive cycles are nearly the same. These results are similar to that of Refs. They reveal an obvious plateau of ultrasonic at- tenuation a above T, and the a drops drastically below T, with an apparent turning point at T,. Besides, two small and one large peaks are located at about , , and K, respectively, and they are all expected to be related to the phaselike transitions. As shown in Figs. The peak near K changes a little when the Pr content in- creases, and it has been confirmed to be related to the phase transition. As pointed out in Refs. This may be the reason why the relaxation peak decreases as the samples were doped by Pr. However, the plateau Q above T, denoted by the dashed line in Figs. Figure 7 shows the internal friction from Figs. By best fitting between the data in Fig. I NUIY - i. The solid line inset expresses the fit of experimental data by using a linear function. This question can also be solved when the coupling property of carriers is taken into account. This means that the relaxation time is also frequency depen- dent. So they have been used to calculate the superconducting gaps b,. But for- tunately there is no such problem for both Bi-Sr-Ca-Cu-0 and Tl-Ba-Ca-Cu-0 samples; the drastic decrease of Q and a below T, may be used to determine the energy gaps if the anomaly near T, is actually due to superconducting condensation. Curves C shown in Figs. The solid lines express the best fitting between the exper- imental data and Eq. From 3 and 4 and Ref. The fitted curves curves b in Figs. As shown in Table V, the superconducting gap and damping rate calculated from experimental data are al- most identical in the kHz to MHz range; these results in- dicate that the mechanisms in kHz and MHz are the same. Because the samples used in our experiments are poly- crystal, the superconducting gap calculated from the ex- perimental data is the weight average along the c direc- tion and in the basal plane. The values of I measured by tunneling and NMR methods are disper- sive. Although the comparison between experimental data and calculated results according formula 6 is good, the use of an imaginary term in the relative jump rate as is done in Eq. So the anomaly of ultrasonic at- tenuation near T, may be smeared by the large back- ground. On the other hand, I is sensitive to the defects in the samples used, and it is obtained that there will be no turning of the dissipation at T, when the I is large enough from formula 6. Yang for help with the measurements of internal friction and ultrasonic attenuation, and also thank Professor G. Shi for offering the samples and measuring the Hall carrier density. We also acknowledge valuable con- versations with Professor H. Shen and Professor J. Gortor North-Holland, Amsterdam, , Vol. Linhai Sun and Yening Wang, Phys. A , 59 ;Y. Fron- ing, and S. B 38, ; G. B 36, Batlogg, in High Temperature Superconductivity, edited by K. Schrieffer Addison-Wesley, Redwood, , pp. Ginsberg World Scientific, Singapore, in press. B 4, Forum , ; Y. Wu, Solid State Commun. B 22, ; K. Alloys Com- pounds to be published ; K. White, Nature , B 38, B 47, He Yusheng et al. C 21, C 21, L Orens- tain et al. B 42, ; B. Today 44 6 , 44 Muller, Solid State Commun. C 16, B 37, Busla, Solid State Commun. B 40, ;D.

Chapter 3 : Ultrasonic attenuation studies in high Tc superconductors

Internal friction and ultrasonic attenuation in solids including high-T c superconductors. Trans Tech Publications Switzerland, Germany, UK, USA (Matreials Science Forum vols.), , p., SRf , ISBN

The results imply the existence of distortion clouds around the carriers, caused by the inelastic electron-phonon interaction. This attenuation, being called the electronic damping, is attributed to electron-phonon scattering. In YBaCuO, the ultrasonic attenua- tion 2-s and even the internal friction in the KHz range z,6 often diminish exponentially below Tc too, thus its decrease was supposed to be related to the high-Tc superconductivity, and was even used to calculate the superconducting energy gaps s. Recently, Saint-Paul et al. The background Qp-1 is nearIy frequency independent, showing a hysteretic character. Such a plateau Qp-1 drops as a linear function of temperature below Tc with a turning point iocated just at Tc. In order to investigate the mechanism responsible for the internal friction plateau, the internal friction of YBazCu3Ox samples with various oxygen content x determined by a method reported elsewhere 9 were measured also in the Id4z range fig. With reduction of the oxygen content x, the background Qp-1 decreases gradually, which can be seen more clearly in the inset of fig. The hysteretic background of the internal friction appearing in crystalline solids is commonly attributed to dislocations t0 or to coherent boundaries in the ferroelastic phase In view of the result for YBazCu3Ox, the decrease of the Qp-1 with x may be speculated to be caused by the diminished carrier density. The hysteretic background Qp-1 may still be ascribed to similar i ne las t i c interactions between structural distortions and the lattice, if such localized structural distortions exist, induced by the carriers, just like the polarons, but movable with carriers. In fact, the existence of such d is tor t ions has been ver i f ied by photo - induced absorpt ion measurements of the copper ox ides 12, and the enhancement of the dynamic e f fec t ive mass of the car r ie r. A rap id decrease o f Qp-1 below Tc imp l ies that ine las t i c e lec t ron-phonon in teract ions perhaps p lay a main ro le in the fo rmat ion of Cooper pa i rs. B C 20 L B 37 B 42 C 21 L B 36 C 21 Ll Sun et a l. B 38 Wang et al, J. Sinica 18 Kim eL a l.

Chapter 4 : Investigation of the lattice instability of Tl2Ba2Ca2Cu3Oy | linsen yang - calendrierdelascience.

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Growth of Bulk ZnO. Reactive Atmospheres for Oxide Crystal Growth. Cahn and Merton C. Flemings and Bernard Ilschner print and Edward J. Thermal conductivity of rare-earth scandates in comparison to other oxidic substrate crystals. Thermodynamic investigations on the growth of CuAlO2 delafossite crystals. Melt growth and properties of bulk BaSnO 3 single crystals. Merino, Steffen Ganschow, Detlef Klimm: Czochralski growth and characterization of cerium doped calcium scandate. Conditions for the growth of Fe1-xO crystals using the micro-pulling-down technique. Reevaluation of phase relations in the chemical system neodymium lutetium oxide NdLuO3. Large-lattice-parameter perovskite single-crystal substrates. On the influence of inversion on thermal properties of magnesium gallium spinel. MgGa2O4 as a new wide bandgap transparent semiconducting oxide: Growth and properties of bulk single crystals. Influence of oxygen partial pressure on SrTiO3 bulk crystal growth from non-stoichiometric melts. Growth Issues and Characterization. Acta Crystallographica Section A: Electronic Materials with Wide Band Gap: LiCAF laser with mW continuous-wave blue â€" nm output. Microstructural Study and Some Properties. Single crystal fiber growth of cerium doped strontium yttrate, SrY2O4: Growth, characterization, and properties of bulk SnO2 single crystals. Effect of heat treatment on properties of melt-grown bulk In2O3 single crystals. Ranieri, Steffen Ganschow, Rosa I. Experimental evaluation and thermodynamic assessment of the LiF-LuF3 phase diagram. Ganschow, A Kwasniewski, R. Melt growth, characterization and properties of bulk In2O3 single crystals. LiCAF laser pumped by one single-spatial-mode diode. Laser-heated pedestal growth of cerium doped calcium scandate crystalfibers. Thermodynamic modeling of the LiF-YF3 phase diagram. Crystal growth of LiGd1-xLuxF4 solid solutions by zone melting technique. High melting point oxides â€" A challenge for crystal growth. Materials Research Society symposia proceedings. Formation of oxygen deficient BaPbO3-x by oxalate decomposition. On the effect of oxygen partial pressure on the chromium distributioncoefficient in melt-grown ruby crystals. Characterization of microstructural defects in melt grown ZnO single crystals. Meyer, Detlev Klimm, Detlev Schulz: Characterization of ZnO crystals grown by the vertical Bridgman method. Application of predominance diagrams in melt growth of oxides. Melt growth of ZnO bulk crystals in Ir crucibles. Pseudohalide vapour growth of thick GaN layers. The melting behavior of lutetium aluminum perovskite LuAlO 3. Melt grown ZnO bulk crystals. Octahedral Cation Exchange in Co0. Identification of Zn-vacancy-hydrogen complexes in ZnO single crystals: A challenge to positron annihilation spectroscopy. Influence of the atmosphere on the growth of LiYF4 single crystal fibers by the micro-pulling-down method. Low-temperature Hydrothermal Growth of ZnO nanocrystals and epitaxial layers. The growth of ZnO crystals from the melt. The phase diagram GdF3-LuF3. Klimm, A Danilewsky, M. Inductively heated Bridgman method for the growth of zinc oxide single crystals. The phase diagram YF3â€"GdF3. Dopant segregations in oxide single-crystal fibers grown by the micro-pulling-down method. Theoretical model for calculation of thermal diffusion factors in diluted binary melts. The solid state phase transformation of potassium sulfate. Czochralski growth of Ti: Preparation, thermal and scintillating properties. Melting behavior and growth of colquiriite laser crystals. The control of iron oxidation state during FeO and olivine crystal growth. Reproducible defect etching of SiC single crystals. A study on the influence of ytterbium and impurities on lattice parameters and the phase transition temperature of Czochralski-grown LiNbO3. Crystal Growth]. OH impurities in GaPO4 crystals: Correlation between infrared absorption and mass loss during thermal treatment. Re-activation of an all solid state oxygen sensor. Growth conditions and composition of terbium aluminum garnet single crystals grown by the micro pulling down technique. Czochralski grown Ga2O3 crystals. LiSrAlF6 by the Czochralski method. The influence of atmosphere on high temperature crystal growth. On the Crystallization of Terbium Aluminium Garnet. Terbium aluminum

garnet â€" phase diagram and crystal growth. Detection of the local phase transition in GaP by dielectric measurements. Ultrasonic deformation of crystals with frequencies near kHz. Plastic deformation of GaAs by ultrasonic treatment. Internal friction and ultrasonic attenuation in solids including high-Tc superconductors. Ultrasonic treatment of GaP and GaAs. Amplitude dependent internal friction of sphalerite type semiconductors. Internal friction in lithium alumino borosilicate glasses. Propagation of cracks in GaP as revealed by measurement of ultrasonic damping. Point defects in GaP single crystals investigated by mechanical damping. LiLa MoO4 2 by the micro-pulling-down method. Progress in the growth of colquiriite type laser host crystals. Lasers and Electro-Optics Europe, LiSrAlF6 crystals by the Czochralski method.

Chapter 5 : Internal friction study of carriers in high-Tc superconductors - [PDF Document]

The volume presents the proceedings of the 6th European Conference, as well as the International Symposia on High Temperature Superconductors and on Mechanical Spectroscopy. Internal Friction and Ultrasonic Attenuation in Solids.

A new low frequency mechanical relaxation spectrum apparatus have been shown. We pointed out that the mechanical relaxation peaks are attributed to anelastic relaxation processes and the transition of rigidly pinned FLL into a depinned state. These methods are nondestructive testing, a powerful tool for studying the properties of the flux-line lattice FLL in the mixed state of high Tc superconductors. They are among the most extensively study aspects of high Tc superconductivity. The different structure of the flux-matter or vortex matter such as lattice and glasses, can be moved under the influence of the Lorentz force. This leads to dissipation and in these conditions, the critical current density is very low. Fluxon confinement "pinning" prevents this motion and then jc can be substantially increased. Therefore, to improve jc, the optimization of the pinning of vortices is the decisive factor. Novel vortex phases, such as muliquanta and composite vortex lattices, vortex fluid coexisting with vortex solid, driven vortex lattices, entangled vortex matter, etc. These phases will be modeled by using modern theoretical and numerical techniques. The fundamental research in the framework of this program will form the basis of the advanced knowledge of the vortex matter in superconductors and will also be of importance to other scientific fields including superfluidity, turbulence, liquid crystals, and plasma physics. Table I summarized the type of results obtained []. Ultrasonic experiments were performed on sample with the lowest dimension along the crystallographic c-axis. Standard pulse echo technique was used with two LiNbO3 transducers. Fig1 A sample arrangement for attenuation measurements by the pulse-echo technique Low frenquency mechanical spectrum method: Fig2 Experiment arrangement used to search for dissipating in sample A very-low-frequency torsional-oscillator method has been developed. The experimental setup is shown in Fig2. The sample is in the form of a thin flat plate or rod wire. The magnetic fields are produced by a conventional electromagnet and applied along c axis of the crystal. The frequency of angular motion is determined by the torsional constant k of the tungsten suspension and the moment of inertia I of the system. It is then released and the resulting damped oscillations is monitored with an analog optoelectronic system. Its circumstances will be gone into detail elsewhere. This apparatus is shown in Fig3. Fig3 a new low frequency mechanical relaxation spectrum apparatus 2. Discussion The acoustic measurements have yielded a great number of results that have been variously interpreted as due to thermally activated depinning pheonomena, to melting of the FLL flux line lattice ,to critical behavior indicative of phase transitions and other possible mechanisms. This dissipation is, naturally , of great technological and scientific interest; the former primarily because it limits the current carrying capacity of such superconductors, and the latter because many features of interaction mechanisms , pinning of vortices and the nature of the various FLL stases are not completely clear and current views are sometimes controversial. In this paper we pointed out the mechanisms of the ultrasonic attenuation peaks and the mechanical dissipating peaks in the mixed state of HTCS high Tc superconductors. First, a large number of experiments show that mechanical relaxation peaks are shown in the following two types: Second, the vortices that have been pinned are the center of tackling the problems. The pinning of the flux line lattices interacting with CuO planes and randomly distributed point defects are studied. The pinning by point defects is described in terms of the collective pinning model. From the viewpoint of thermodynamics, it is more favorable to place a flux line between superconducting layers CuO plans in HTCS than at one of them. The pinning by point defects bulk pinning destroys the long range order in FLL. Third, since the elastic constants and wave velocities are directly related to the second derivative of the Gibbs free energy with respect to strain, such measurements constitute an important probe of phase transitions. In fact, many of the low frequency peaks are found to occur at higher temperatures than the high frequency ones. These results indicate that the processes observed by acoustic measurements are not the traditional, thermally activated relaxation type. This excellent agreement between

theory and experiment excludes other possible explanations such as, for instance, FLL melting of the attenuation peak. We therefore conclude from these results that for sufficiently small driving force, flux-line motion is mainly diffusive in character. The further discussion shall be made on the theory of dynamics of FLL. C 39 D. Wang, Physica C , G. Pank ect, Physca C

Chapter 6 : A Comprehensive Introduction to USTC::Key Laboratories of CAS

In YBaCuO, the ultrasonic attenuation2'5 and even the internal friction in the KHz range2.s often diminish exponentially below Tc too, thus its decrease was supposed to be related to the high-Tc superconductivity, and was even used to calculate the superconducting energy gapss.

Received in revised form The internal friction and longitudinal modulus along with electrical and magnetic properties have been 25 August measured. The Accepted 21 November anomalies in longitudinal modulus and the internal friction peak at TCO are attributed to Jahnâ€"Teller effect. Available online 28 November A strong correlation between the temperature dependent elastic, anelastic, resistivity, and ac susceptibility Keywords: Magnetic materials a qualitative model. Introduction and bond lengths. Ever since the discovery of colossal magnetoresistance CMR The structural, electrical, and magnetic properties of Ndâ€"Ca phenomenon among the mixed-valence pervoskite manganites manganites have been explored by various workers [7â€"10]. Due to complex interplay between tural, electrical, and magnetic properties. Numerous efforts have charge, spin, and lattice degrees of freedom, remarkable, and been made to characterize and to understand the CO and other interesting phenomena have been observed in these compounds. At low concentra- The interesting electrical and magnetic properties exhibited by tions these materials exhibit ferromagnetic insulating phase FMI these materials originate from the doubleâ€"exchange DE inter- â€" paramagnetic insulating phase PMI transition. However, magnetic insulating PMI transition takes place. The study of subsequent studies revealed that the CMR phenomenon exhibited internal friction and elastic modulus using ultrasonic techniques by these materials is attributed not only to DE interaction but also is a nondestructive and sensitive tool not only for exploring the to other interactions such as Jahnâ€"Teller interactions, antiferro- defects and microscopic processes in solids but also very success- magnetic superâ€"exchange SE , and charge-orbital ordering [6]. As the ultrasonic velocity and internal friction are lattice related properties, they can elucidate these phase transi- tions more effectively. In fact, recently the authors of the present n Corresponding author. NC-4 Bragg position Intensity a. The powders were calcined at 1C for 8 h followed by sintering at 1C for 6 h in air. FEI Company to examine the surface morphology of the samples. By a determining the resonant frequency fs of the composite system and Volume A composite oscillator was formed by cementing d 0. All the manganite specimen bars were repeatedly annealed thermally prior to the measurements of longitudinal modulus and internal friction to minimize the It can be seen from the table that the lattice parameters are defects in the samples if any. Results and discussion ratio values were estimated using the iodometric titrations and are found to be closer to their stoichiometric values Table 1. Magnetic properties having a single phase, without any detectable impurities. The behavior, which brings down the FM interaction. Therefore, the transition is not sudden but there is a small hump in the observed decrease of susceptibility is expected. It seems to be in consistent with the information about the magnetic nature of these charge ordered two-phase model as explained earlier [9]. It can be and charge ordering transitions TCO respectively. Surprisingly, the susceptibility of TCO is found to the beginning exhibiting a charge ordering transition TCO at increase considerably while that of TN has decreased. On further decrease of temperature another transition NC-4 sample also exhibits two transitions at which is not has been observed at K and is due to antiferromagnetic Neel clearly visible and K corresponding to TN and TCO respec- transition TN. Both the transitions are consistent with the tively. The susceptibility behavior of the samples of the present susceptibility results. The sharp rise in magnetization magnitude of real part of ac susceptibility decreases continuously below K is due to ordering of Nd ions [22]. It can be seen diminishes. The observed behavior may be explained as follows: In the case of NC-3 netic matrix. In fact, the change in the path is clearly seen all the samples is also shown in Fig. The behavior of NC-2 sample is different from that perature for all the samples except for NC Up to their Neel K. All these magnetotransport properties are in consistent experimental and theoretical points match well, indicating that with the literature reported data, which were prepared by the adiabatic small polaron

model may be suited to explain the conventional solid state method [8,10]. Here kB uted to charge delocalization. Longitudinal modulus behavior is longitudinal optical phonon frequency. The formation of small polarons due to Jahnâ€"Teller distortions also makes the strong Besides variation in the resistivity and susceptibility behavior applicability of the small polaron hopping model. The small at the TCO, there are generally changes of crystal parameters polaron size is generally of the order of one unit cell. In order to accompanied by the charge ordering. In fact, the lattice para- test the applicability of the adiabatic small polaron model to the meters variations were reported in Nd0. Similar behavior of change in the 9 modulus was observed near TC in other manganites [15]. The behavior is similar to that found at MHz frequencies by other authors [7]. On cooling the samples from room temperature, the longitudinal sound wave softens continuously reaching a minimum value at TCO. On further 0 cooling, the modulus increases drastically, signaling stiffening of the lattice and is a characteristic feature of the cooperative JT phase transition [28]. At the CO transition, the dramatic decrease -3 in the modulus may be attributed to the large electron-phonon coupling via Jahnâ€"Teller effect. In fact, a similar remarkable change of modulus in the vicinity of TCO was also reported in -6 other manganites [29]. This shows that, the lattice softening during 3 the CO transition exhibits essential signatures of a phase trans- formation. Further, the anomalous hardening of the elastic wave is related to the ordering of localized polarons around TCO, and 0 may be regarded as an evidence for strong electron-phonon coupling via Jahnâ€"Teller effect [30]. In addition to the longitudinal modulus softening at about TCO, we note anomalies in modulus curves around TN, which can be -3 regarded as an evidence for spin-phonon coupling. This anomaly might arise -6 from the AFM spin ordering which may induce a small distortion 0. The coupling between the lattice strain and T-1 K-1 magnetic moments is responsible for the anomalies of modulii at TN. We think that, there should exist lattice distortion in the longitudinal modulus varies with Ca composition. As Ca increases samples of present investigation also near TCO, too. These changes, from 0. The transitions at â€" K K. In the manganites the samples. However the transitions found around â€" K could coupling is predominantly due to phonons and the ultrasonic not be noticed in the susceptibility versus temperature behavior methods provide direct information of the softening of the appro- of NC-2, NC-3, and NC-4 samples of present study. According to priate elastic constant near the transition temperature. This electronâ€"lattice interaction promises elastic atomic or inter molecular space. In the absence of any phase measurement to be a powerful probe to reveal the role of charge, transition the sound velocity should decrease linearly with orbital, and lattice degrees of freedom in these samples. In recent increasing temperature due to thermal expansion of the sample. In transitions found around â€" K. But, one can say that the fact, Chen et al. Therefore, an attempt The CO transition is closely related to the strong electron-phonon has been made to explain the anomalous elastic behavior in the coupling originating from the Jahnâ€"Teller JT effect. Based on this theory, the following two equations were derived [36] mainly to explain the The modulus softening, caused by the lattice distortion, can variation of elastic moduli with temperature both below and above also be sensitively observed in the internal friction behavior. These characteristics are very similar to and those of materials that undergo phase transformations [37]. The peak is asymmetric, and it may be due to the presence of inhomogeneous phases below TC. Corresponding to the changes of longitudinal moduli at is Boltzmann Constant and y is phonon exchange constant. In fact, while the solid lines are theoretical curves. Therefore, one may Podzorov et al. These authors attributed the high values due the ideas of JT effect. Reports are also available in â€" B 54 phase coexistence of charge ordered CO and charge disordered â€" In view of these observations, one may [9] I. The movements of the phase boundaries [11] S. This observation is in conformity with the electrical and magne- [13] F. B 64 tization studies. Ge, the CMR phenomena. In fact, it was pointed out by Dagotto et al. B 69 Venugopal Reddy, Solid State Commun. Similar observations on intrinsic inho- Internal Friction and Ultrasonic Attenuation in Solids, Beijing, China, , mogenities were also made earlier in internal friction studies International Academic, Beijing, Rodriguez, Physica B 55â€" On the basis of anomalies observed in the electrical resistivity, [21] B. B 62 â€" B 58 studies at charge ordering and Neel antiferromagnetic transition â€" B 60 â€" Rao, Solid State Sci. It has been observed that internal friction is a

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[27] D. Finally, the elastic anomalies observed in the [29] A. Kincoid, J Chem Phys. A â€" The authors also thank Dr. Banerjee of [36] G. Matter 21 B 56 the electrical and ac susceptibility studies.

Chapter 7 : Internal Friction and Ultrasonic Attenuation in Solids

In a similar manner, the 14th International Conference on Internal Friction and Ultrasonic Attenuation in Solids, ICIFUAS, which took place in Kyoto Terrsa, Japan, on September , , was convened under a new name, the 14th International Conference on Internal Friction and Mechanical Spectroscopy, ICIFMS

Chapter 8 : Materials Science and Engineering A Mechanical - calendrierdelascience.com

Internal friction (Qâˆ'1) results of Hg-based cuprate superconductors with (Tc = 94 K) and (Tc = K) phases are reported. The internal friction reveals a plateau (Qâˆ'1) above Tc and.

Chapter 9 : Ultrasonics of High-Tc and Other Unconventional Superconductors von Moises Levy auf calend

Physiea C () North-Holland INTERNAL FRICTION STUDY OF CARRIERS IN HIGH-Tc SUPERCONDUCTORS Linhai Sun, Yening Wang and Zhen Yu Nat iona l Laboratory.