

Contents

Foreword	S. MINOMURA	v
Organizing Committee		vii

Chapter 1. Ultra-High Pressure

An Update of the P,T Phase Diagram of Elemental Carbon	F. P. BUNDY	1
Ultrahigh-Pressure Experiments at Pressures Exceeding 2 Megabars	H. K. MAO, K. A. GOETTEL and P. M. BELL	11
High Pressure and High Temperature Experiment with Sintered Diamond Anvil	S. ENDO, W. UTSUMI, M. OKAJIMA and S. TOYODA	19

Chapter 2. Electronic Structure

Pressure Tuning of Electronic Energy Levels	H. G. DRICKAMER	25
The Effect of Pressure on the Electrical Resistance of Metallic Li	G. OOMI and S. B. WOODS	31
Tightly-Bound-on-the-Bond Approximation for the Polymorphy of Covalent Crystals	M. SHIBUYA	37
Electronic Band Structures for Hole-Metal States of Iodine in High-Pressure Phases	Y. NATSUME	43
Coexistence of Metallic and Covalent Bonding Characters in Pressure-Induced NaCl-Type InSb	T. KOBAYASI, K. SHINDO and H. NARA	49

Chapter 3. Optical Properties

Effect of Pressure on the Optical Absorption in Nearly-Free Electron Metals	K. SYASSEN, K. TAKEMURA and H. TUPS	55
CsI, RbI and KI, Approaching the Metallization Transition	K. ASAUMI, Y. KONDO, T. MORI and T. SUZUKI	63
Band-Overlap Metallization of BaTe and BaSe	A. L. RUOFF and T. A. GRZYBOWSKI	69
Reflectance of $M(S_{1-x}Se_x)_2$ ($M=Ni, Co$) under High Pressure	H. TAKAHASHI, N. MÖRI, S. YOMO, Z. JIN, K. TSUJI and S. MINOMURA	75
Dependence of Raman Frequencies and Scattering Intensities on Pressure in Small-Band-Gap Semiconductors	K. AOKI, E. ANASTASSKIS and M. CARDONA	81
Study of the Hyper-Raman Scattering in Solids under Pressure	K. INOUYE, S. AKIMOTO and T. ISHIDATE	87

Chapter 4. Structure

Structure (Raman and Brillouin Scattering)

Brillouin Scattering on H ₂ O above 70 GPa: Transition to Symmetric Ice (Ice X)	A. POLIAN, J. M. BESSON and M. GRIMSDITCH	93
Brillouin Scattering of ZnO under High Pressure	T. ISHIDATE, K. YAMAMOTO, K. INOUE and M. SHIBUYA	99
Approach to Molecular Dissociation in Chlorine, Bromine and Iodine under Pressure	P. G. JOHANNSEN, E. F. DÜSING and W. B. HOLZAPFEL	105
Molecular Solids under High Pressure	K. KOBASHI, R. D. ETTERS, I. L. SPAIN, M. -M. THIÉRY, D. FABRE and V. CHANDRASEKHARAN	109
Raman Scattering Study of Halogen-Bridged Mixed-Valence Metal Complexes under High Pressure	H. TANINO, N. KOSHIZUKA, K. KOBAYASHI and M. YAMASHITA	115
Kinetic Observations of Pressure-Induced Phase Transition in HgI ₂ by Raman Scattering	K. J. TAKANO and M. WAKATSUKI	121

Structure (X-ray Diffraction)

High-Pressure X-Ray Studies of Cs and Eu	K. TAKEMURA and K. SYASSEN	127
High-Pressure Polymorphs of ZrO ₂	L. C. MING and M. H. MANGHNANI	135
Physical Properties of Some Chalcogenides under Pressure	A. ONODERA, A. OHTANI, T. SEIKE, M. MOTOBAYASHI, O. SHIMOMURA and H. KAWAMURA	141
A New High-Pressure Form of SnTe	K. MURATA, A. ONODERA, Y. FUJII, Y. YAMADA, T. YAGI and S. AKIMOTO	145
X-Ray Diffraction and Mössbauer Spectrum on the High Pressure Phase of Fe ₂ O ₃	T. SUZUKI, T. YAGI, S. AKIMOTO, A. ITO, S. MORIMOTO and Y. SYONO	149
Pressure-Induced Amorphous Metallic State in SnI ₄	Y. FUJII, M. KOWAKA, A. ONODERA and S. SUGAI	155
Staging Transitions in Graphite Intercalation Compounds	D. B. MCWHAN, J. D. AXE, H. J. KIM, H. MERTWÖY, T. KOCH and J. E. FISCHER	161
Three Decades after Lowdin's Work on Ionic Crystals	J. YAMASHITA	167
Observation of the Orientation Relation in Pressure-Induced Polymorphic Transition by an X-Ray Four-Circle Diffractometer	M. NOMURA, K. KURODA, M. INOUE and H. FUJIWARA	171
B1-B2 Transition and Mode Instability at Pressures	B. OKAI	177

Structure (Dielectric Properties)

Structural Phase Transitions at High Pressure: Quantum Effects G. A. SAMARA 183

Raman Spectra and Phase Transitions of NH₄F at High Pressure G. ZOU, Y. ZHAO, Q. CUI and Z. JIN 191

Structure (Black Phosphorus)

Black Phosphorus under High Pressure A. MORITA and H. ASAHIWA 197

Phase Transition in Phosphorus and Antimony at High Pressure and High Temperature T. KIKEGAWA and H. IWASAKI 201

Pressure Induced Phase Transitions in Black Phosphorus I. SHIROTANI, A. FUKIZAWA, H. KAWAMURA, T. YAGI and S. AKIMOTO 207

Chapter 5. Superconductivity

Anomalous Superconductivity in Black Phosphorus under High Pressure H. KAWAMURA, I. SHIROTANI and K. TACHIKAWA 213

Superconducting Phosphorus: New Interesting Phenomena J. WITTIG, B. BIRECKOVEN and T. WEIDLICH 217

High Pressure Study on the Re-Entrant Superconducting Resistive Transition in Ba-Pb-Bi-O C. W. CHU, T. H. LIN, M. K. WU, P. H. HOR and X. C. JIN 223

Chapter 6. Magnetic Properties

High Pressure Properties of the 1d-Antiferromagnet MEM-(TCNQ)₂ D. BLOCH, J. VOIRON and C. VETTIER 229

High Pressure Neutron Scattering Experiments on Incommensurate Commensurate Transitions Y. ENDOH 235

Pressure Effect on the Band Electron Magnetism H. FUJIWARA 241

Recent High Pressure Studies on NiS₂ N. MŌRI, M. KAMADA, H. TAKAHASHI, G. OOMI and J. SUSAKI 247

The Effects of Pressure on the Magnetic Phase Transition Temperature of Hf_{0.8}Ta_{0.2}Fe₂ K. WATANABE, N. MŌRI, Y. NISHIHARA, Y. YAMAGUCHI and S. OGAWA 253

Pressure Effect on the Dense Kondo State of CeB₆ N. MŌRI, N. SATO and T. KASUYA 259

The Effect of Pressure on the Magnetic Properties of Fe₆₅(Ni_{1-x}Mn_x)₃₅ Invar Alloys K. OKAMOTO and N. MŌRI 263

Pressure Effects on the First-Order Transition Temperatures of Cu₄SnS₄ and Cu₈GeS₆ K. OZAWA and S. ANZAI 269

Chapter 7. Non-Crystalline Materials

Pressure and Light Induced Metastable States in Amorphous Semiconductors S. MINOMURA 275

Cryogenic-Pressure Luminescence Studies of Defect Structure in Amorphous and Crystalline Chalcogenide Semiconductors	B. A. WEINSTEIN	285
Semiconductor-Metal Transition and Structural Modification in Amorphous Se-Te Mixtures under High Pressure	K. TAMURA, M. MUSHIAGE and H. ENDO	291
Morphology of Medium Range Order in IV-VI Glasses at High Pressures	K. MURASE, T. FUKUNAGA, K. YAKUSHIJI and T. YOSHIMI	297
Structural Transition of Glassy Metallic Alloys under High Pressure	H. IWASAKI and W. K. WANG	303
Electronic and Thermodynamic Properties of Fluid Hg under High Temperature and Pressure	H. ENDO, N. KITANO and M. YAO	311
High-Pressure Raman and FT-IR Studies of Liquid and Solid Methylene Halides up to 100 kbar	H. SHIMIZU	317
Pressure Dependence of Glass Transition Temperature in $M(I)NO_3-Cd(NO_3)_2$ Glasses ($M(I) = Li, Na, K, Rb, Cs$ and Tl)	H. KANNO, M. OGAWA and T. IWANAGA	323
Chapter 8. Synchrotron Radiation		
A Review of High Pressure Research with Synchrotron Radiation and Recent Kinetics Studies	E. F. SKELTON, S. B. QADRI, W. T. ELAM and A. W. WEBB	329
Applications of Synchrotron Radiation in High Pressure-Temperature Mineralogy	W. A. BASSETT, M. D. FURNISH and E. HUANG	335
Equation of State and Phase Transition Studies under <i>in situ</i> High P-T Conditions Using Synchrotron Radiation	M. H. MANGHNANI, L. C. MING, J. BALOGH, S. B. QADRI, E. F. SKELTON and D. SCHIFERL	343
Multi-Anvil Type X-Ray System for Synchrotron Radiation	O. SHIMOMURA, S. YAMAOKA, T. YAGI, M. WAKATSUKI, K. TSUJI, H. KAWAMURA, N. HAMAYA, O. FUKUNAGA, K. AOKI and S. AKIMOTO	351
Time-Resolved X-Ray Diffraction Analysis of the Phase Transition in BaS at High Pressures and High Temperatures	N. HAMAYA, T. YAGI, S. YAMAOKA, O. SHIMOMURA and S. AKIMOTO	357
Precise Measurement of Compressibility of Gold at Room and High Temperatures	T. YAGI, O. SHIMOMURA, S. YAMAOKA, K. TAKEMURA and S. AKIMOTO	363
Direct Observation of the Conversion Reaction from Graphite to Diamond	S. YAMAOKA, O. SHIMOMURA, T. YAGI and S. AKIMOTO	369
High Pressure and Low Temperature Experiments Using Synchrotron Radiation	K. TSUJI	375
Author Index		381