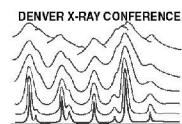


Advances in X-ray Analysis
Volumes 1- 39 (1957 – 1995)



**Volume 38. Forty-third Annual Conference on
Applications of X-ray Analysis, August 1-5, 1994**

**Table of
Contents**

**View
Document**

CONTENTS

I. DYNAMIC CHARACTERIZATION OF MATERIALS BY POWDER DIFFRACTION

DYNAMIC CHARACTERIZATION IN ADVANCED MANUFACTURING	1
R. L. Snyder and B-J. Chen	
NON-INVASIVE TEMPERATURE MEASUREMENTS BY NEUTRON DIFFRACTION IN AERO-ENGINE COMPONENTS	9
T. M. Holden, J. H. Root, D. C. Tennant and D. Leggett	
PICOSECOND X-RAY DIFFRACTION: SYSTEM AND APPLICATIONS	21
I. V. Tomov, P. Chen and P. M. Rentzepis	
APPLICATIONS OF NEUTRON POWDER DIFFRACTION IN MATERIALS RESEARCH	35
S. J. Kennedy	

II. PHASE ANALYSIS, ACCURACY AND STANDARDS IN POWDER DIFFRACTION

ACCURACY IN QUANTITATIVE X-RAY POWDER DIFFRACTION ANALYSES	47
D. L. Bish and S. J. Chipera	
THE IMPACT OF BACKGROUND FUNCTION ON HIGH ACCURACY QUANTITATIVE RIETVELD ANALYSIS (QRA): APPLICATION TO NIST SRMs 676 AND 656	59
R. B. Von Dreele and J. P. Cline	
QUANTITATIVE PHASE ANALYSIS USING THE WHOLE-POWDER-PATTERN DECOMPOSITION METHOD: II. SOLUTION USING EXTERNAL STANDARD MATERIALS	69
H. Toraya	
AN ANALYSIS OF THE EFFECT OF DIFFERENT INSTRUMENTAL CONDITIONS ON THE SHAPES OF X-RAY POWDER LINE PROFILES	75
R. W. Cheary and J. P. Cline	
QUANTITATIVE X-RAY DIFFRACTION ANALYSIS OF SMECTITES: I — MASS ATTENUATION CALCULATIONS FOR SMECTITE ANALYSES	83
H. Chen and B. L. Davis	

X-RAY DIFFRACTION ANALYSIS OF PM-10 AEROSOLS EXTRACTED BY ULTRASOUND	91
B. L. Davis and H. Chen	
JCPDS-INTERNATIONAL CENTRE FOR DIFFRACTION DATA LOW-ANGLE POWDER DIFFRACTION STUDY OF SILVER BEHENATE	99
T. Blanton, T. Huang, H. Toraya, C. Hubbard, S. Robie, D. Louër, H. Göbel, G. Will, R. Gilles and T. Raftery	
UPGRADING SULFIDE MINERAL PATTERNS FOR THE ICDD POWDER DIFFRACTION FILE	107
G. J. McCarthy, D. G. Grier and P. Bayliss	
A FULL-TRACE DATABASE FOR THE ANALYSIS OF CLAY MINERALS	117
D. K. Smith, G. G. Johnson, Jr. and R. Jenkins	
III. APPLICATIONS OF DIFFRACTION TO SEMICONDUCTORS AND FILMS	
DETERMINATION OF THICKNESS AND COMPOSITION OF THIN $\text{Al}_x\text{Ga}_{1-x}\text{As}$ LAYERS ON GaAs BY TOTAL ELECTRON YIELD (TEY)	127
M. F. Ebel, R. Svagera, H. Ebel, R. Hobl, M. Mantler, J. Wernisch and N. Zagler	
NONDESTRUCTIVE CHARACTERIZATION OF MULTILAYER THIN FILMS BY X-RAY REFLECTIVITY	139
T. C. Huang	
LEAST-SQUARES REFINEMENT OF X-RAY REFLECTIVITY DATA OBTAINED WITH A CONVENTIONAL POWDER diffractometer	145
R. Gilles, G. Will, F. Elf and T. C. Huang	
DIFFRACTION SPACE MAPPING OF HETEROEPITAXIAL LAYERS	151
M. Halliwell	
X-RAY ROCKING CURVE ANALYSIS OF STRAINED HETEROINTERFACES AND QUANTUM WELLS	165
C. R. Wie	
INTERFACES AND STRAIN IN InGaAsP/InP HETEROSTRUCTURES ASSESSED WITH DYNAMICAL SIMULATIONS OF HIGH-RESOLUTION X-RAY DIFFRACTION CURVES	175
J. M. Vandenberg	
HIGH RESOLUTION X-RAY DIFFRACTION MEASUREMENTS OF STRAIN RELAXED SiGe/Si STRUCTURES	181
P. M. Mooney, J. L. Jordan-Sweet, G. B. Stephenson, F. K. LeGoues and J. O. Chu	
HIGH RESOLUTION X-RAY DIFFRACTOMETRY AND TOPOGRAPHY OF FLOAT-ZONE GaAs CRYSTALS GROWN IN MICROGRAVITY	195
N. Loxley, C. D. Moore, M. Safa, B. K. Tanner, G. F. Clark, F. M. Herrmann and G. Mueller	
RECIPROCAL SPACE MAPPING OF EPITAXIAL MATERIALS USING POSITION-SENSITIVE X-RAY DETECTION	201
S. R. Lee, B. L. Doyle, T. J. Drummond, J. W. Medernach and R. P. Schneider, Jr.	

REAL TIME SYNCHROTRON TOPOGRAPHY USING A CID ARRAY CAMERA WITH DIGITAL IMAGE ACQUISITION AND PROCESSING	215
J. M. Winter, Jr. and R. E. Green, Jr.	
HOMOGENEOUS STRAIN RELAXATION AND MOSAIC SPREAD IN InGaAs/GaAs HETEROSTRUCTURES USING TRIPLE AXIS DIFFRACTOMETRY	221
M. S. Goorsky, K. M. Matney, G. Chu, R. S. Goldman and K. L. Kavanagh	
APPLICATION OF LINE MODIFIED-ASYMMETRIC CRYSTAL TOPOGRAPHY FOR QUALITATIVE AND QUANTITATIVE EVALUATION OF INTEGRATED CIRCUITS	227
K. A. Green, W. T. Beard, X. J. Zhang and R. W. Armstrong	
FLUORINE IMPLANTATION AND RESIDUAL STRESSES IN POLYSILICON FILMS	235
L. Lowry, P. Zschack and R. De Angelis	
IN-SITU STUDY OF DYNAMIC STRUCTURAL REARRANGEMENTS DURING STRESS RELAXATION	243
A. D. Westwood, C. E. Murray and I. C. Noyan	
DETERMINATION OF Z-PROFILES OF DIFFRACTION DATA FROM τ -PROFILES USING A NUMERICAL LINEAR INVERSION METHOD	255
X. Zhu, B. Ballard and P. Predecki	
COMPARISON OF INVERSE LAPLACE AND NUMERICAL INVERSION METHODS FOR OBTAINING Z-DEPTH PROFILES OF DIFFRACTION DATA	263
X. Zhu, P. Predecki and B. Ballard	
DETERMINATION OF COMPOSITION AND PHASE DEPTH-PROFILES IN MULTILAYER AND GRADIENT SOLID SOLUTION PHOTOVOLTAIC FILMS USING GRAZING INCIDENCE X-RAY DIFFRACTION	269
B. L. Ballard, X. Zhu, P. K. Predecki, D. Albin, A. Gabor, J. Tuttle and R. Noufi	
COMPUTATIONAL (ω, ϕ) X-RAY DIFFRACTOMETRY FOR SINGLE CRYSTAL ANALYSIS	277
D. Dragoi	
IV. NEW DEVELOPMENTS IN X-RAY SOURCES, INSTRUMENTATION AND TECHNIQUES	
SYNCHROTRON X-RAY MICROBEAM CHARACTERISTICS FOR X-RAY FLUORESCENCE ANALYSIS	283
A. Iida and T. Noma	
DESCRIPTION OF X-RAY TUBE SPECTRA BY THE DEPTH DISTRIBUTION FUNCTION OF POCHOU AND PICHOIR	291
B. Schoßmann, J. Wernisch and H. Ebel	
EFFECT OF X-RAY TUBE WINDOW THICKNESS ON DETECTION LIMITS FOR LIGHT ELEMENTS IN XRF ANALYSIS	299
D. J. Whalen and D. C. Turner	

THE STUDY OF SOME PECULIAR PHENOMENA IN ULTRA-SOFT X-RAY MEASUREMENTS USING SYNTHETIC MULTILAYER CRYSTALS H. Kobayashi, K. Toda, H. Kohno, T. Arai and R. Wilson	307
DEVELOPMENT OF A HIGH SENSITIVITY TXRF WITH A NOVEL MONOCHROMATOR HAVING THREE SELECTABLE CRYSTALS T. Yamada, T. Shoji, M. Funabashi, T. Utaka, T. Arai and R. Wilson	313
COMBINED XRD AND XRF ANALYSIS FOR PORTABLE AND REMOTE APPLICATIONS J. A. Kerner, E. D. Franco and J. Marshall	319
TOTAL ELECTRON YIELD (TEY) A NEW APPROACH FOR QUANTITATIVE X-RAY ANALYSIS H. Ebel, R. Svagera, M. F. Ebel and N. Zagler	325
MANUFACTURE AND USE OF SETTING UP SAMPLES F. R. Feret	337
STANDARD XRF ANALYTICAL METHODS FOR THE MINING, MINERAL PROCESSING AND METALLURGY INDUSTRY S. L. Birch, K. Norrish and J. G. H. Metz	353
A NOVEL DUMOND MONOCHROMATOR FOR HIGH-RESOLUTION X-RAY DIFFRACTION N. Loxley, B. K. Tanner and D. K. Bowen	361
A NEW HIGH DYNAMIC RANGE X-RAY DETECTOR S. Cockerton and B. K. Tanner	371
AUTOMATED MEASUREMENT OF GRAIN ORIENTATIONS AND ON-LINE DETERMINATION OF COMPLETE DEFORMATION SYSTEMS WITH A TEM R. A. Schwarzer and S. Zaefferer	377
SCANNING X-RAY APPARATUS FOR CRYSTAL TEXTURE MAPPING AND MICRO-FLUORESCENCE ANALYSIS R. A. Schwarzer and M. Wehrhahn	383
V. RESIDUAL STRESS, CRYSTALLITE SIZE AND rms STRAIN DETERMINATION BY DIFFRACTION METHODS	
AN EVALUATION OF DECONVOLUTION TECHNIQUES IN X-RAY PROFILE BROADENING ANALYSIS AND THE APPLICATION OF THE MAXIMUM ENTROPY METHOD TO ALUMINA DATA W. Kalceff, N. Armstrong and J. P. Cline	387
ACCURATE MODELING OF SIZE AND STRAIN BROADENING IN THE RIETVELD REFINEMENT: THE "DOUBLE-VOIGT" APPROACH D. Balzar and H. Ledbetter	397
DETECTION AND MODELLING OF MICRO-CRYSTALLINITY BY MEANS OF X-RAY POWDER DIFFRACTOMETRY G. Berti	405
LINE PROFILE ANALYSES OF RHODIUM METAL OBTAINED BY DECOMPOSITION OF RHODIUM CARBONYL D. Chandra, H. Mandalia, M. L. Garner, M. K. Blakely and K. H. Lau	413

X-RAY FRACTOGRAPHIC STUDY ON TiAl ALLOYS WITH VARIOUS TYPES OF MICROSTRUCTURES	427
H. Tabata, Z. Yajima and Y. Hirose	
X-RAY FRACTOGRAPHIC STUDY ON FRACTURE SURFACE OF NEW LIGHT METAL	435
H. Matsuoka, Y. Hirose, S. Takahashi, Z. Yajima and Y. Kishi	
X-RAY FRACTOGRAPHY ON FATIGUE FRACTURED SURFACE OF AUSTENITIC STAINLESS STEEL	443
Z. Yajima, H. Tokuyama, Y. Kibayashi and Y. Hirose	
INVESTIGATION OF RESIDUAL STRESSES IN A SLEEVE COLDWORKED LUG SPECIMEN BY NEUTRON AND X-RAY DIFFRACTION	455
R. Lin, B. Jaensson, T. M. Holden, R. B. Rogge and J. H. Root	
THE INFLUENCE OF STRESS GRADIENT ON X-RAY STRESS MEASUREMENT	463
M. Ohtsuka, H. Matsuoka, Y. Hirose and H. Ishii	
RESIDUAL STRESS IN ION IMPLANTED TITANIUM NITRIDE STUDIED BY PARALLEL BEAM GLANCING INCIDENCE X-RAY DIFFRACTION	471
D. E. Geist, A. J. Perry, J. R. Treglio, V. Valvoda, and D. Rafaja	
SEPARATION OF INTERNAL STRAINS AND LATTICE DISTORTION CAUSED BY OXYGEN IMPURITIES IN ALUMINUM NITRIDE HOT-PRESSED CERAMICS	479
O. N. Grigorov, S. M. Kushnerenko, K. A. Plotnikov and W. Kreher	
VI. POLYMER APPLICATIONS OF X-RAY SCATTERING	
REAL-TIME X-RAY SCATTERING OF BINARY POLYMER BLENDS: POLY(BUTYLENE TEREPHTHALATE)/POLYCARBONATE	489
M. V. Brillhart, P. Cebe and M. Capel	
CRYSTALLINITY AND UNIT CELL VARIATIONS IN LINEAR HIGH-DENSITY POLYETHYLENE	495
K. B. Schwartz, J. Cheng, V. N. Reddy, M. Fone and H. P. Fisher	
USE OF A CCD-BASED AREA DETECTION SYSTEM ON A FIBRE DIFFRACTOMETER	503
S. Hanna and A. H. Windle	
USING AN AREA DETECTOR TO DETERMINE THE ORIENTATION DISTRIBUTION FUNCTION	511
B. A. Squires and K. L. Smith	
GENERATION OF CRYSTALLOGRAPHIC PACKING CANDIDATES WITH FIXED HELICAL SYMMETRY AND AXIAL ADVANCE: APPLICATION TO PI-2 POLYIMIDE	517
J. M. Waller and R. K. Eby	
REAL TIME X-RAY RHEOLOGY OF POLYMERS	531
J. A. Pople, G. R. Mitchell and C. K. Chai	

VII. MICROBEAM XRD AND XRS ANALYSIS

APPLIED CRYSTALLOGRAPHY IN THE SCANNING ELECTRON MICROSCOPE USING A CCD DETECTOR	539
R. P. Goehner and J. R. Michael	
THE CHARACTERISATION OF MICROTTEXTURE BY ORIENTATION MAPPING	547
R. A. Schwarzer, S. Zaeferer and K. Kunze	
A NEW APPROACH IN PERFORMING MICRODIFFRACTION ANALYSIS	551
D. J. Winter and B. A. Squires	
ANALYSIS OF HETEROGENEOUS MATERIALS WITH X-RAY MICROFLUORESCENCE AND MICRODIFFRACTION	557
D. A. Carpenter, A. Gorin and J. T. Shor	

VIII. IN VIVO APPLICATIONS OF XRS

IN VIVO X-RAY FLUORESCENCE OF LEAD AND OTHER TOXIC TRACE ELEMENTS	563
D. R. Chettle	
DEVELOPMENT OF L-LINE X-RAY FLUORESCENCE INSTRUMENTATION AND ITS APPLICATIONS TO IN-VIVO MEASUREMENT OF LEAD IN BONE	573
J. F. Rosen	
ADAPTATION OF THE EGS4 MONTE CARLO CODE FOR THE DESIGN OF A POLARIZED SOURCE FOR X-RAY FLUORESCENCE ANALYSIS OF PLATINUM AND OTHER HEAVY METALS IN VIVO	579
D. G. Lewis, A. Kilic and C. A. Ogg	
IN VIVO MEASUREMENTS OF MERCURY USING X-RAY FLUORESCENCE ANALYSIS	587
J. Börjesson, L. Barregård, G. Sällsten, A. Schütz, R. Jonson, M. Alpstén and S. Mattsson	
ASSAYING DEPLETED URANIUM IN BONES IN-SITU USING A NON-INVASIVE X-RAY FLUORESCENCE TECHNIQUE	595
P. Bloch and I. M. Shapiro	
IN VIVO X-RAY FLUORESCENCE OF BONE LEAD IN THE STUDY OF HUMAN LEAD METABOLISM; SERUM LEAD, WHOLE BLOOD LEAD, BONE LEAD, AND CUMULATIVE EXPOSURE	601
K. M. Cake, D. R. Chettle, C. E. Webber, C. L. Gordon, R. J. Bowins, R. H. McNutt and C. Vaillancourt	
SKIN THICKNESS EFFECTS ON IN VIVO LXRF	607
I. L. Preiss and W. Washington II	
DEVELOPMENT OF A MERCURIC IODIDE DETECTOR ARRAY FOR IN-VIVO X-RAY IMAGING	615
B. E. Patt, J. S. Iwanczyk, M. P. Tornai, C. S. Levin, and E. J. Hoffman	
DEVELOPMENT OF BONE-LEAD REFERENCE MATERIALS FOR VALIDATING IN VIVO XRF MEASUREMENTS	625
P. J. Parsons, Y. Y. Zong and M. R. Matthews	

ENVIRONMENTAL FACTORS CONTRIBUTING TO THE BODY BURDEN OF LEAD AS DETERMINED BY IN VIVO X-RAY FLUORESCENCE S. J. S. Ryde, S. J. Jones, C. J. Evans, D. G. Lewis, and W. D. Morgan	633
SUMMARY OF A WORKSHOP on "In Vivo XRF Measurements of Heavy Elements" L. Wielopolski and R. W. Ryon	641
IX. XRS MATHEMATICAL METHODS, TRACE ANALYSIS AND OTHER APPLICATIONS	
3-D GRAPHING OF XRF MATRIX CORRECTION EQUATIONS A. J. Klimasara	649
DIGITAL SPECTRUM PROCESSING OF THE CHARACTERISTIC K-LINES OF THE LANTHANIDES V. I. Smolniakov and I. A. Koltoun	657
SCATTERING CONTRIBUTIONS TO THE INTENSITIES OF THE CHARACTERISTIC K-LINES OF THE LANTHANIDES V. I. Smolniakov	665
IMPROVEMENT OF THE SMOOTHING PROCEDURE VIA PRELIMINARY LOGARITHMIC TRANSFORMATION OF THE X-RAY SPECTRUM K. N. Stoev and J. F. Dlouhy	673
DISTORTION OF THE PEAK SHAPE DUE TO THE DISCRETE SAMPLING OF X-RAY SPECTRA K. N. Stoev and J. F. Dlouhy	681
TRACE ANALYSIS BY TXRF R. S. Hockett	687
ACCURATE MEASUREMENT OF TRACE ELEMENTS USING AN INNOVATIVE FIXED GONIOMETER FOR A SIMULTANEOUS SPECTROMETER K. Kansai, K. Toda, H. Kohno, T. Arai and R. Wilson	691
DESIGN OF AN X-RAY FLUORESCENCE SENSOR FOR THE CONE PENETROMETER W. T. Elam and J. V. Gilfrich	699
CHARACTERIZATION OF THE TIN DIFFUSION INTO FLOAT GLASS USING GLANCING ANGLE X-RAY CHARACTERIZATION P. J. LaPuma, R. L. Snyder, S. Zdzieszynski and R. Brückner	705
DETERMINATION OF NITROGEN AND OTHER ELEMENTS IN PLANT MATERIAL BY X-RAY FLUORESCENCE D. Bonvin, K. Juchli, B. W. Adamson	711
FPXRF, EDXRF AND ICP COMPARISON OF Pb CONTAMINATED SOILS FROM LEADVILLE, COLORADO C. A. Kuharic and W. H. Cole	725
QUALITY ASPECTS IN SELECTING, INSTALLING AND MAINTAINING AN XRF SPECTROMETER P. L. Warren	731

SPECIMEN PREPARATION FOR X-RAY FLUORESCENCE ANALYSIS OF SOLUTIONS	735
L. P. Eksperiandova, Z. M. Spolnik, A. B. Blank and B. B. Aliseychik	
X. STRUCTURAL AND OTHER APPLICATIONS OF POWDER DIFFRACTION	
X-RAY DIFFRACTION STUDY OF BaNd ₂ CuO ₅ AT HIGH PRESSURES	741
W. Wong-Ng, G. J. Piermarini and M. R. Gallas	
RE: CRYSTAL STRUCTURES OF PYROAURITE AND SJÖGRENITE	749
A. Olowe	
AN IN SITU XRD TECHNIQUE FOR ANNEALING INVESTIGATIONS	757
D. E. Hoylman, S. C. Axtell and B. W. Robertson	
EFFECT OF BORON ON THE AMORPHIZATION OF Zr-Ti-Ni-Cu ALLOY	763
J. D. Makinson, R. J. De Angelis and S. C. Axtell	
THERMAL PREPARATION EFFECTS ON THE X-RAY DIFFRACTOGRAMS OF COMPOUNDS PRODUCED DURING FLUE GAS DESULFURIZATION	769
D. L. Wertz, K. H. Burns, R. W. Keeton, E. Dille, S. Angelovich and S. Hassett	
Author Index	775
Subject Index	779