

Contents

| | |
|---|------|
| PREFACE | xi |
| ACKNOWLEDGMENTS | xiii |
| MATERIALS RESEARCH SOCIETY SYMPOSIUM PROCEEDINGS | xiv |
| PART I: REVIEW OF RECENT DEVELOPMENTS | |
| *SURFACE, INTERFACE AND THIN-FILM MAGNETISM: AN OVERVIEW L.M. Falicov | 3 |
| PART II: NOVEL MEASUREMENT TECHNIQUES | |
| *MAGNETIC DOMAIN IMAGING OF EPITAXIAL THIN FILMS BY SPIN-POLARIZED SCANNING ELECTRON MICROSCOPY R. Allenspach and M. Stampanoni | 17 |
| *SOFT X-RAY MAGNETIC SCATTERING STUDY OF THIN FILMS AND MULTILAYERS C.-C. Kao, E.D. Johnson, J.B. Hastings, D.P. Siddons, and C. Vettier | 27 |
| *SPIN-POLARIZED SCANNING TUNNELING MICROSCOPY (SPSTM) R. Wiesendanger, D. Buergler, G. Tarrach, I.V. Shvets, and H.-J. Guentherodt | 37 |
| PART III: SPIN POLARIZED SPECTROSCOPIES | |
| *SPIN POLARIZED PHOTOEMISSION STUDIES OF SURFACES AND THIN FILMS Peter D. Johnson, N.B. Brookes, and Y. Chang | 49 |
| SPIN POLARIZED PHOTOEMISSION FROM Fe ON Cu(100) D.P. Pappas, K.-P. Kämper, B.P. Miller, H. Hopster, D.E. Fowler, A.C. Luntz, C.R. Brundle, and Z.-X. Shen | 59 |
| THEORETICAL STUDIES OF SPIN DEPENDENT SCATTERINGS OF ELECTRONS FROM FERROMAGNETIC SURFACES AND ULTRA THIN FILMS A. Ormeci, M.P. Gokhale, Burl M. Hall, and D.L. Mills | 65 |
| SPIN-POLARIZED EELS ON ULTRATHIN fcc Co LAYERS ON Cu(100) K.-P. Kamper, D.L. Abraham, and H. Hopster | 71 |
| *SPIN POLARIZATION OF Pt IN Pt/Co MULTILAYERS STUDIED BY X-RAY ABSORPTION G. Schütz, H. Ebert, P. Fischer, S. Rüegg, and W.B. Zeper | 77 |
| *Invited Paper | |

| | |
|--|----|
| INVESTIGATION OF SURFACE MAGNETISM BY DETECTION OF POLARIZED LIGHT EMITTED AFTER LOW ENERGY He ⁺ SCATTERING OFF A Fe(110) SURFACE | 87 |
| M. Schleberger, A. Nürmann, W. Heiland, C. Huber, and J. Kirschner | |

PART IV: RARE-EARTH THIN FILMS AND MULTILAYERS

| | |
|--|-----|
| *EPITAXIAL RARE-EARTH SUPERLATTICES AND FILMS | 95 |
| M.B. Salamon, R.S. Beach, J.A. Borchers, R.W. Erwin, C.P. Flynn, A. Matheny, J.J. Rhyne, and F. Tsui | |
| MULTIPLY FINE STRUCTURE OF THE Gd AND Tb 5P LEVELS | 107 |
| Dongqi Li, P.A. Dowben, and M. Onellion | |
| REFLECTIVITY AND GRAZING ANGLE DIFFRACTION OF POLARIZED NEUTRONS | 113 |
| J.F. Ankner, C.F. Majkrzak, D.A. Neumann, A. Matheny, and C.P. Flynn | |
| STRUCTURAL AND MAGNETIC X-RAY SCATTERING MEASUREMENTS OF EPITAXIAL Dy THIN FILMS | 119 |
| Michael F. Toney, David G. Wiesler, Brent D. Hermsmeier, and Robin F. Farrow | |
| FERRIMAGNETIC BEHAVIOR AND MAGNETORESISTANCE OF Fe/Gd DOUBLE STRUCTURED MULTILAYER FILMS | 125 |
| H. Fujimori, Y. Kamiguchi, Y. Hayakawa, and K. Takanashi | |

PART V: INTERLAYER EXCHANGE COUPLING - EXPERIMENT

| | |
|---|-----|
| *OSCILLATION IN THE INTERLAYER COUPLING OF Fe FILMS ACROSS Cr FILMS MEASURED BY MEANS OF LIGHT SCATTERING FROM SPIN WAVES AND M(H)-CURVES | 133 |
| S. Demokritov, J.A. Wolf, P. Grünberg, and W. Zinn | |
| OSCILLATORY INTERLAYER EXCHANGE COUPLING THROUGH Cu AND VARIOUS TRANSITION METALS | 145 |
| S.S.P. Parkin | |
| CEMS INTERFACE STUDY OF (Fe/M)-MULTILAYERS (M=Cr,Gd) | 153 |
| Ch. Sauer, J. Landes, W. Zinn, and H. Ebert | |
| INTERLAYER MAGNETIC COUPLING IN SPUTTERED Ag/Ni SUPERLATTICES | 159 |
| Carlos A. dos Santos and Bernard Rodmacq | |
| INFLUENCE OF LAYER STRUCTURE ON ANTIFERROMAGNETIC EXCHANGE COUPLING OF IRON FILMS THROUGH CHROMIUM INTERLAYERS | 165 |
| A.P. Payne, H. Kataoka, M. Farle, and B.M. Clemens | |

*Invited Paper

| | |
|---|-----|
| MAGNETIC EXCHANGE INTERACTION BETWEEN Fe(110) LAYERS ACROSS A Ag(111) INTERVENING LAYER Z.Q. Qiu, C.J. Gutierrez, H. Tang, S.H. Mayer, and J.C. Walker | 171 |
| PART VI: INTERLAYER EXCHANGE COUPLING - THEORY | |
| *THEORY OF OSCILLATORY EXCHANGE BETWEEN MAGNETIC LAYERS THROUGH A NONMAGNETIC TRANSITION-METAL SPACER J. Mathon | 179 |
| INTERLAYER MAGNETIC COUPLING IN TRANSITION-METAL MULTILAYERED STRUCTURES Peter M. Levy, J.L. Fry, and E.C. Ethridge | 189 |
| LONG AND SHORT RANGE OSCILLATORY EXCHANGE COUPLING IN Fe/Cu AND Co/Cu MAGNETIC MULTILAYERS F. Herman, J. Sticht, and M. Van Schilfgaarde | 195 |
| MAGNETISM IN 4d TRANSITION METAL Ag(001) SANDWICHES Dennis P. Clougherty, M.E. McHenry, and J.M. MacLaren | 203 |
| PART VII: COPPER BASED MULTILAYERS | |
| GIANT MAGNETORESISTANCE AND OSCILLATORY INTERLAYER EXCHANGE COUPLING IN COPPER BASED MULTILAYERS S.S.P. Parkin | 211 |
| MAGNETISM AND MAGNETORESISTANCE OF MULTILAYERS WITH TWO MAGNETIC COMPONENTS. I. Cu-BASED FILMS H. Yamamoto, T. Okuyama, H. Dohnomae, and T. Shinjo | 217 |
| MAGNETISM AND MAGNETORESISTANCE OF MULTILAYERS WITH TWO MAGNETIC COMPONENTS. II. Au-BASED FILMS T. Okuyama, H. Dohnomae, H. Yamamoto, and T. Shinjo | 223 |
| NMR STUDY ON THE NANOSTRUCTURE OF Co/X MULTILAYERS W.J.M. de Jonge, H.A.M. de Gronckel, K. Kopinga, P. Panissod, and F.J.A. den Broeder | 229 |
| EPITAXIAL Co-Cu SUPERLATTICES Elizabeth Schuler, Sezai Elagoz, William Vavra, Frank Lamelas, Hui David He, and Roy Clarke | 235 |
| PART VIII: GIANT MAGNETORESISTANCE IN Fe/Cr SUPERLATTICES | |
| MAGNETIC AND TRANSPORT PROPERTIES OF ION BEAM SPUTTERED Fe/Cr MULTILAYERS K. Inomata, S.N. Okuno, S. Hashimoto, and K. Yusu | 243 |

*Invited Paper

| | |
|--|-----|
| MAGNETISM AND MAGNETORESISTANCE OF Fe/Cr COMPOSITE MULTILAYERS | 249 |
| Satoru Araki, Yoshikazu Narumiya, and Teruya Shinjo | |
| MAGNETORESISTANCE OF MAGNETICALLY UNCOUPLED MULTILAYERED STRUCTURES | 255 |
| Shufeng Zhang and Peter M. Levy | |
| THE EFFECT OF SPIN DEPENDENT SCATTERING FROM IMPURITIES ON GIANT MAGNETORESISTANCE AND THERMAL CONDUCTIVITY IN Fe/Cr MULTILAYERS | 261 |
| B.L. Johnson and R.E. Camley | |
| PART IX: THIN FILM GROWTH | |
| MORPHOLOGIES OF SOLID SURFACES PRODUCED FAR FROM EQUILIBRIUM | 269 |
| R. Stanley Williams, Robijn Bruinsma, and Joseph Rudnick | |
| PART X: THIN FILM MAGNETISM | |
| *ANISOTROPY ENERGIES AND CRITICAL BEHAVIOR OF ULTRATHIN Ni(111) FILMS GROWN ON SMOOTH AND ROUGH W(110) | 289 |
| Yi Li and K. Baberschke | |
| *MAGNETIZATION AND CURIE TEMPERATURE OF FERROMAGNETIC ULTRATHIN FILMS: THE INFLUENCE OF MAGNETIC ANISOTROPY AND DIPOLAR INTERACTIONS | 299 |
| P. Bruno | |
| MORPHOLOGY AND MAGNETIC PHASE TRANSITIONS OF MONOLAYER- RANGE Fe FILMS ON Au(001) | 311 |
| Y.-F. Liew and G.C. Wang | |
| THICKNESS DEPENDENCE OF THE FERROMAGNETISM OF Pd FILMS | 317 |
| S. Bouarab, C. Demangeat, A. Mokrani, and H. Dreyse | |
| STEPPED Fe(100) AND V/Fe(100) MAGNETISM | 323 |
| A. Vega, A. Rubio, L.C. Balbas, J. Dorantes-Davila, C. Demangeat, A. Mokrani, and H. Dreyse | |
| SUBSTRUCTURE-MAGNETIC PROPERTY CORRELATION IN Co/Ag COMPOSITE THIN FILMS | 329 |
| C.P. Reed, R.J. Deangelis, S.H. Liou, S. Nafis, John A. Woollam, K.W. Lee, and R.J. Jacob | |
| SMALL d-SPACING AND INTERNAL STRESS OF Co-Cr FILMS DEPOSITED BY Kr ION SPUTTERING | 335 |
| S. Akiyama, S. Nakagawa, and M. Naoe | |

*Invited Paper

| | |
|---|-----|
| EPITAXIAL γ MnAl/AlAs/GaAs HETEROSTRUCTURES WITH PERPENDICULAR MAGNETIZATION | 341 |
| T. Sands, J.P. Harbison, S.J. Allen, Jr., M.L. Leadbeater, T.L. Cheeks, M.J.S.P. Brasil, C.C. Chang, R. Ramesh, L.T. Florez, F. Derosa, and V.G. Keramidas | |
| ORDERING IN $Zn_{0.5}Fe_{0.5}Se$ EPILAYERS GROWN ON InP SUBSTRATES BY MOLECULAR BEAM EPITAXY | 347 |
| L. Salamanca-Riba, K. Park, and B.T. Jonker | |
| PART XI: MULTILAYERS | |
| *HIGH-PRESSURE X-RAY DIFFRACTION STUDIES OF ELASTIC ANOMALIES IN SUPERLATTICE | 355 |
| Y. Fujii, Y. Ohishi, H. Konishi, N. Nakayama, and T. Shinjo | |
| MAGNETIC AND STRUCTURAL CHARACTERISTICS OF MULTI-LAYERED FILMS COMPOSED OF Fe AND Si ULTRA-THIN LAYERS | 367 |
| K. Kubota, M. Nagakubo, and M. Naoe | |
| STRUCTURE AND MAGNETISM OF Ni/Fe MULTILAYERS | 373 |
| Nigel M. Jennett and D.J. Dingley | |
| MAGNETIC PROPERTIES OF SPUTTERED Ni/Al MULTILAYERS | 379 |
| E. Tsang, J.C. Cates, M. Tan, A. Waknis, C. Alexander, Jr., M.R. Parker, and J.A. Barnard | |
| MBE-GROWN EPITAXIAL Co/Cr SUPERLATTICES | 385 |
| W. Vavra, S. Elagoz, Roy Clarke, and C. Uher | |
| STRUCTURAL PROPERTIES OF EPITAXIAL Co-Cr SUPERLATTICES | 391 |
| S. Elagoz, W. Vavra, C. Uher, and Roy Clarke | |
| MICRO- AND NANOSTRUCTURE OF Co/Pd AND Co/Au MULTILAYERS STUDIED WITH TRANSMISSION ELECTRON MICROSCOPY | 397 |
| F. Hakkens, W. Coene, and F.J.A. den Broeder | |
| MÖSSBAUER MEASUREMENTS OF INTERFACIAL MAGNETISM OF MBE GROWN Fe(100)/Ag(100) MULTILAYERS | 405 |
| H. Tang, M.D. Wiczorek, D.J. Keavney, D.F. Storm, C.J. Gutierrez, Z.Q. Qiu, and J.C. Walker | |
| A COMPARISON OF GROWTH AND MAGNETIC PROPERTIES OF Fe(110)/Ag(111) AND Fe(100)/Ag(100) MULTILAYERS | 411 |
| J.C. Walker, H. Tang, M.D. Wiczorek, D.J. Keavney, D.F. Storm, Z.Q. Qiu, and C.J. Gutierrez | |
| THE ENHANCED MAGNETIZATION OBSERVED IN Fe/Mo MULTILAYERS DEPOSITED BY ION-BEAM SPUTTERING | 417 |
| Y. Wang, F.Z. Cui, W.Z. Li, and Y.D. Fan | |

*Invited Paper

| | |
|---|-----|
| INVESTIGATION OF MAGNETIC ORDER IN IRON OXIDE-NICKEL OXIDE SUPERLATTICES WITH MODULATION WAVELENGTH LESS THAN 80 Å | 423 |
| S.D. Berry, D.M. Lind, G. Chern, H. Mathias, and L.R. Testardi | |
| PREPARATION AND MAGNETISM OF $\text{CuO}/\text{Al}_2\text{O}_3$ AND CuO/MgO ARTIFICIAL SUPERSTRUCTURED FILMS | 427 |
| Mitsugu Sohma and Kenji Kawaguchi | |
| ABSORPTION OF RADIATION BY MAGNETIC SUPERLATTICES | 433 |
| J.G. LePage and R.E. Camley | |
| PART XII: PERPENDICULAR MAGNETIC ANISOTROPY AND MAGNETO-OPTICS | |
| *PERPENDICULAR MAGNETIC ANISOTROPY OF Pd/Co AND RELATED MULTILAYERS | 441 |
| S. Tsunashima, K. Nakamura, H. Takahashi, S. Fukatsu, and S. Uchiyama | |
| THE ROLE OF NEXT-NEAREST NEIGHBORS IN THE NÉEL MODEL OF SURFACE ANISOTROPY FOR bcc CRYSTALS | 453 |
| Robert L. White and Bruce M. Clemens | |
| MAGNETIC ANISOTROPY OF CRYSTALLINE DEFECTS | 459 |
| B.M. Clemens, R.L. White, W.D. Nix, and J.A. Bain | |
| MAGNETIC ANISOTROPY OF EPITAXIAL Co/Pt SUPERLATTICES | 465 |
| C.J. Chien, B.M. Clemens, S.B. Hagstrom, R.F.C. Farrow, C.H. Lee, E.E. Marinero, and C.J. Lin | |
| THE PERPENDICULAR MAGNETIC ANISOTROPY AND STRUCTURE OF SPUTTERED Ag/Co, Pd/Co, AND AgPd/Co MULTILAYERED FILMS | 473 |
| Akira Yamaguchi, We-Hyo Soe, Ryoichi Yamamoto, and Masonobu Kobayashi | |
| MAGNETIC ANISOTROPY DETERMINED FROM ANGULAR DEPENDENT MAGNETIZATION MEASUREMENTS | 479 |
| P.J.H. Bloemen, E.A.M. van Alphen, W.J.M. de Jonge, and F.J.A. den Broeder | |
| MAGNETOELASTIC INTERACTIONS AT SURFACES AND INTERFACES | 485 |
| R.C. O'Handley and S. Sun | |
| MAGNETO-OPTICAL ENHANCEMENT OF TbFeCo/Al FILMS AT SHORT WAVELENGTH | 491 |
| Kibong Song, Hiroshi Ito, and Masahiko Naoe | |
| OPTICAL AND MAGNETO-OPTICAL MODELING OF ULTRA-THIN FILM MULTILAYERS | 497 |
| William A. McGahan, Ping He, and John A. Woollam | |
| AUTHOR INDEX | 503 |
| SUBJECT INDEX | 507 |
| *Invited Paper | |