



Paul Fuoss

Distinguished Staff Scientist, SLAC National Accelerator Laboratory

Bio

BIO

Paul H. Fuoss is Head of Experimental Design for the Linac Coherent Light Source where he focuses on the development of new x-ray instrumentation and techniques that exploit the capabilities of the world's first hard x-ray free electron laser.

As a graduate student at Stanford, Fuoss did his research at SLAC, using X-rays from what later became the Stanford Synchrotron Radiation Lightsource (SSRL) to investigate chalcogenide glasses. During that research, he created and developed "differential anomalous scattering" to solve important problems that required detailed understanding of the local atomic structure in liquids and glasses. The experimental and analysis approach he developed is still in wide use.

Moving on to a post-doc at Bell Labs, Fuoss worked with Peter Eisenberger and Bill Marra to create techniques to bring the power and simplicity of x-ray scattering to the study of surface structures. As a young scientist at Bell in the 1980's, he collaborated with Ian Robinson to design and build beamline X16A at the National Synchrotron Light Source. The X16A ultra-high vacuum (UHV) diffractometer, the first in the world, was used to determine surface structures with unprecedented clarity. Fuoss explored such varied topics as fundamental aspects of melting, the nature of the technologically important Si-SiO₂ interface, and optical phase-change materials.

In the course of this work, Fuoss realized that these x-ray techniques offered the opportunity for real-time studies of important materials science processes at near-atmospheric pressure and above. Partnering with David Kisker, a crystal grower at Bell Labs, and Sean Brennan at SSRL, he built a chemical vapor deposition (CVD) system adapted for real-time x-ray measurements. Installed on the PEP storage ring undulator line 5B, this system produced spectacular results revealing atomically sharp surfaces despite the complex CVD chemical environment. After the PEP program was cut short by the Loma Prieta earthquake, the team moved the system to SSRL and performed a series of experiments revealing mechanisms of CVD crystal growth that were both unexpected and which confirmed a solid connection with classic crystal growth literature.

Amid the rapid development of information technology in the late 90's, Fuoss took a six-year detour into AT&T Laboratories. Exploring approaches to merge AT&T's existing telephone network with rapidly emerging internet and cellular capabilities, he developed several novel services and led the effort to move them from Research into the business units. That experience, focused on making complex systems user friendly, has proven very useful as x-ray experiments become increasingly complicated.

In 2002, Fuoss moved to the Materials Science Division at Argonne and renewed his research in x-ray science. His work at Argonne focused on exploring time-dependent processes in crystal growth, ferroelectric materials, and ionic conduction in materials for energy applications. His work integrated advances in detectors, optics, and high brightness x-ray sources to study the evolution of materials on time scales ranging from femtoseconds to hours.

After fifteen years of research using both the Advanced Photon Source and LCLS, Fuoss moved to SLAC in 2017 to focus on the development of robust experimental facilities that exploit development of the scientific opportunities enabled by the next generation LCLS-II.

Throughout his career, Fuoss has been active as a leader in the broader x-ray science community. Among other things, he has been Chair of the SSRL Users Organization, Chair of the APS Users Organization Steering Committee, and Chair of the LCLS-II Facility Advisory Committee. His contributions have been recognized at Argonne with The University of Chicago Medal for Distinguished Performance at Argonne National Laboratory in 2013, and at SLAC with the Farrel W. Lytle Award in 2015.

CURRENT ROLE AT STANFORD

Head of Experimental Design, LCLS

HONORS AND AWARDS

- Farrel W. Lytle Award, SSRL, SLAC National Accelerator Laboratory (2015)
- Distinguished Performance Award At Argonne National Laboratory, The University of Chicago (2013)
- Fellow, American Physical Society (1999)
- NSF Post-Doctoral Fellowship (declined), National Science Foundation (1980)
- IBM Pre-Doctoral Fellow (at Stanford University), IBM (1976-1977)
- University Honors Fellowship, Stanford University (1975-1976)

EDUCATION AND CERTIFICATIONS

- PhD, Stanford University , Materials Science and Engineering (1980)
- M.S., Stanford University , Materials Science and Engineering (1976)
- B.S., South Dakota School of Mines and Technology , Physics (1975)

PATENTS

- Paul Fuoss, Stephan Hruszkewycz, Ashish Tripathi, Andrew Ulvestad, Stefan Wild. "United States Patent 10078305 Method for phase retrieval to reduce a sampling requirement when imaging a dynamic process", UChicago Argonne, LLC, Apr 19, 2018
- Paul Fuoss. "United States Patent 8220766 Table Guard Assembly", Jul 17, 2012
- Paul Fuoss, Howard Katseff, Bethany Robinson. "United States Patent 7894836 Method and System for Handwritten Electronic Messaging", AT&T, Feb 22, 2011
- Paul Fuoss, Howard Katseff, Bethany Robinson. "United States Patent 7224,991 Method and System for Handwritten Electronic Messaging", AT&T, May 29, 2007
- Paul Fuoss, Howard Katseff, Bethany Robinson. "United States Patent 7120241 Method and Apparatus for Controlling a Network Device", AT&T, Oct 10, 2006
- Paul Fuoss, Howard Katseff, Bethany Robinson. "United States Patent 7003308 Method and System for Handwritten Electronic Messaging", AT&T, Feb 21, 2006
- Paul Fuoss, Howard Katseff, Bethany Robinson. "United States Patent 6970696 Method and Apparatus for Controlling a Network Device", AT&T, Nov 29, 2005

LINKS

- Google Scholar: <https://scholar.google.com/citations?hl=en&user=ncrwTLcAAAAJ>

- LCLS Website: <https://lcls.slac.stanford.edu/>

Publications

PUBLICATIONS

- **A multi-scale cognitive interaction model of instrument operations at the Linac Coherent Light Source.** *The Review of scientific instruments*
Segal, J. I., Hu, W. L., Fuoss, P. H., Ritter, F. E., Shrager, J.
2025; 96 (1)
- **Structural changes across thermodynamic maxima in supercooled liquid tellurium: A water-like scenario.** *Proceedings of the National Academy of Sciences of the United States of America*
Sun, P., Monaco, G., Zalden, P., Sokolowski-Tinten, K., Antonowicz, J., Sobierajski, R., Kajihara, Y., Baron, A. Q., Fuoss, P., Chuang, A. C., Park, J., Almer, J., Hastings, et al
2022; 119 (28): e2202044119
- **A Contrast Calibration Protocol for X-ray Speckle Visibility Spectroscopy** *APPLIED SCIENCES-BASEL*
Sun, Y., Esposito, V., Hart, P., Hansson, C., Li, H., Nakahara, K., MacArthur, J., Nelson, S., Sato, T., Song, S., Sun, P., Fuoss, P., Sutton, et al
2021; 11 (21)
- **Generation of highly mutually coherent hard-x-ray pulse pairs with an amplitude-splitting delay line** *PHYSICAL REVIEW RESEARCH*
Li, H., Sun, Y., Vila-Comamala, J., Sato, T., Song, S., Sun, P., Seaberg, M. H., Wang, N., Hastings, J. B., Dunne, M., Fuoss, P., David, C., Sutton, et al
2021; 3 (4)
- **Nonuniform Flow Dynamics Probed by Nanosecond X-Ray Speckle Visibility Spectroscopy.** *Physical review letters*
Sun, Y., Carini, G., Chollet, M., Decker, F. J., Dunne, M., Fuoss, P., Hruszkewycz, S. O., Lane, T. J., Nakahara, K., Nelson, S., Robert, A., Sato, T., Song, et al
2021; 127 (5): 058001
- **Nonuniform Flow Dynamics Probed by Nanosecond X-Ray Speckle Visibility Spectroscopy** *PHYSICAL REVIEW LETTERS*
Sun, Y., Carini, G., Chollet, M., Decker, F., Dunne, M., Fuoss, P., Hruszkewycz, S. O., Lane, T. J., Nakahara, K., Nelson, S., Robert, A., Sato, T., Song, et al
2021; 127 (5)
- **Accurate contrast determination for X-ray speckle visibility spectroscopy** *JOURNAL OF SYNCHROTRON RADIATION*
Sun, Y., Montana-Lopez, J., Fuoss, P., Sutton, M., Zhu, D.
2020; 27: 999–1007
- **Accurate contrast determination for X-ray speckle visibility spectroscopy.** *Journal of synchrotron radiation*
Sun, Y., Montana-Lopez, J., Fuoss, P., Sutton, M., Zhu, D.
2020; 27 (Pt 4): 999-1007
- **Foreword to the special virtual issue on X-ray free-electron lasers** *JOURNAL OF SYNCHROTRON RADIATION*
Fuoss, P. H., Schlichting, I., Tschentscher, T., Yabashi, M.
2020; 27: 576
- **Realizing split-pulse x-ray photon correlation spectroscopy to measure ultrafast dynamics in complex matter** *PHYSICAL REVIEW RESEARCH*
Sun, Y., Dunne, M., Fuoss, P., Robert, A., Zhu, D., Osaka, T., Yabashi, M., Sutton, M.
2020; 2 (2)
- **Design of an amplitude-splitting hard x-ray delay line with subnanoradian stability** *OPTICS LETTERS*
Li, H., Sun, Y., Sutton, M., Fuoss, P., Zhu, A.
2020; 45 (7): 2086–89
- **Double-pulse speckle contrast correlations with near Fourier transform limited free-electron laser light using hard X-ray split-and-delay.** *Scientific reports*
Roseker, W. n., Lee, S. n., Walther, M. n., Lehmkuhler, F. n., Hankiewicz, B. n., Rysov, R. n., Hruszkewycz, S. O., Stephenson, G. B., Sutton, M. n., Fuoss, P. H., Sikorski, M. n., Robert, A. n., Song, et al
2020; 10 (1): 5054

- **Speckle correlation as a monitor of X-ray free-electron laser induced crystal lattice deformation.** *Journal of synchrotron radiation*
Plumley, R. n., Sun, Y. n., Teitelbaum, S. n., Song, S. n., Sato, T. n., Chollet, M. n., Nelson, S. n., Wang, N. n., Sun, P. n., Robert, A. n., Fuoss, P. n., Sutton, M. n., Zhu, et al
2020; 27 (Pt 6): 1470–76
- **Coherent X-ray spectroscopy reveals the persistence of island arrangements during layer-by-layer growth** *NATURE PHYSICS*
Ju, G., Xu, D., Highland, M., Thompson, C., Zhou, H., Eastman, J. A., Fuoss, P. H., Zapol, P., Kim, H., Stephenson, G.
2019; 15 (6): 589-+
- **Compact hard x-ray split-delay system based on variable-gap channel-cut crystals** *OPTICS LETTERS*
Sun, Y., Wang, N., Song, S., Sun, P., Chollet, M., Sato, T., van Driel, T. B., Nelson, S., Plumley, R., Montana-Lopez, J., Teitelbaum, S. W., Haber, J., Hastings, et al
2019; 44 (10): 2582–85
- **Characterization of the X-ray coherence properties of an undulator beamline at the Advanced Photon Source** *JOURNAL OF SYNCHROTRON RADIATION*
Ju, G., Highland, M. J., Thompson, C., Eastman, J. A., Fuoss, P. H., Zhou, H., Dejus, R., Stephenson, G.
2018; 25: 1036-1047
- **Towards ultrafast dynamics with split-pulse X-ray photon correlation spectroscopy at free electron laser sources** *NATURE COMMUNICATIONS*
Roseker, W., Hruszkewycz, S. O., Lehmkuehler, F., Walther, M., Schulte-Schrepping, H., Lee, S., Osaka, T., Struder, L., Hartmann, R., Sikorski, M., Song, S., Robert, A., Fuoss, et al
2018; 9: 1704
- **An instrument for *in situ* coherent x-ray studies of metal-organic vapor phase epitaxy of III-nitrides** *REVIEW OF SCIENTIFIC INSTRUMENTS*
Ju, G., Highland, M. J., Yanguas-Gil, A., Thompson, C., Eastman, J. A., Zhou, H., Brennan, S. M., Stephenson, G., Fuoss, P. H.
2017; 88 (3): 035113
- **High-resolution three-dimensional structural microscopy by single-angle Bragg ptychography** *NATURE MATERIALS*
Hruszkewycz, S. O., Allain, M., Holt, M. V., Murray, C. E., Holt, J. R., Fuoss, P. H., Chamard, V.
2017; 16 (2): 244-251
- **Three Dimensional Variable-Wavelength X-Ray Bragg Coherent Diffraction Imaging** *PHYSICAL REVIEW LETTERS*
Cha, W., Ulvestad, A., Allain, M., Chamard, V., Harder, R., Leake, S. J., Maser, J., Fuoss, P. H., Hruszkewycz, S. O.
2016; 117 (22): 225501
- **Utilizing broadband X-rays in a Bragg coherent X-ray diffraction imaging experiment** *JOURNAL OF SYNCHROTRON RADIATION*
Cha, W., Liu, W., Harder, R., Xu, R., Fuoss, P. H., Hruszkewycz, S. O.
2016; 23: 1241-1244
- **A liquid jet setup for x-ray scattering experiments on complex liquids at free-electron laser sources** *REVIEW OF SCIENTIFIC INSTRUMENTS*
Steinke, I., Walther, M., Lehmkuehler, F., Wochner, P., Valerio, J., Mager, R., Schroer, M. A., Lee, S., Roseker, W., Jain, A., Sikorski, M., Song, S., Hartmann, et al
2016; 87 (6): 063905
- **Strain Imaging of Nanoscale Semiconductor Heterostructures with X-Ray Bragg Projection Ptychography** *PHYSICAL REVIEW LETTERS*
Holt, M. V., Hruszkewycz, S. O., Murray, C. E., Holt, J. R., Paskiewicz, D. M., Fuoss, P. H.
2014; 112 (16): 165502
- **Coherent Bragg nanodiffraction at the hard X-ray Nanoprobe beamline** *PHILOSOPHICAL TRANSACTIONS OF THE ROYAL SOCIETY A-MATHEMATICAL PHYSICAL AND ENGINEERING SCIENCES*
Hruszkewycz, S. O., Holt, M. V., Maser, J., Murray, C. E., Highland, M. J., Folkman, C. M., Fuoss, P. H.
2014; 372 (2010): 20130118
- **Imaging Local Polarization in Ferroelectric Thin Films by Coherent X-Ray Bragg Projection Ptychography** *PHYSICAL REVIEW LETTERS*
Hruszkewycz, S. O., Highland, M. J., Holt, M. V., Kim, D., Folkman, C. M., Thompson, C., Tripathi, A., Stephenson, G. B., Hong, S., Fuoss, P. H.
2013; 110 (17): 177601

- **Modular instrument mounting system for variable environment *in operando* X-ray experiments** *REVIEW OF SCIENTIFIC INSTRUMENTS*
Folkman, C. M., Highland, M. J., Perret, E., Kim, S. K., Fister, T. T., Zhou, H., Baldo, P. M., Seifert, S., Eastman, J. A., Fuoss, P. H., Fong, D. D.
2013; 84 (2): 025111
- **High Contrast X-ray Speckle from Atomic-Scale Order in Liquids and Glasses** *PHYSICAL REVIEW LETTERS*
Hruszkewycz, S. O., Sutton, M., Fuoss, P. H., Adams, B., Rosenkranz, S., Ludwig, K. F., Roseker, W., Fritz, D., Cammarata, M., Zhu, D., Lee, S., Lemke, H., Gutt, et al
2012; 109 (18): 185502
- **Quantitative Nanoscale Imaging of Lattice Distortions in Epitaxial Semiconductor Heterostructures Using Nanofocused X-ray Bragg Projection Ptychography** *NANO LETTERS*
Hruszkewycz, S. O., Holt, M. V., Murray, C. E., Bruley, J., Holt, J., Tripathi, A., Shpyrko, O. G., McNulty, I., Highland, M. J., Fuoss, P. H.
2012; 12 (10): 5148-5154
- **Ultrafast Photovoltaic Response in Ferroelectric Nanolayers** *PHYSICAL REVIEW LETTERS*
Daranciang, D., Highland, M. J., Wen, H., Young, S. M., Brandt, N. C., Hwang, H. Y., Vattilana, M., Nicoul, M., Quirin, F., Goodfellow, J., Qi, T., Grinberg, I., Fritz, et al
2012; 108 (8)
- **Equilibrium Polarization of Ultrathin PbTiO_3 with Surface Compensation Controlled by Oxygen Partial Pressure** *PHYSICAL REVIEW LETTERS*
Highland, M. J., Fister, T. T., Fong, D. D., Fuoss, P. H., Thompson, C., Eastman, J. A., Streiffer, S. K., Stephenson, G. B.
2011; 107 (18): 187602
- **Framework for three-dimensional coherent diffraction imaging by focused beam x-ray Bragg ptychography** *OPTICS LETTERS*
Hruszkewycz, S. O., Holt, M. V., Tripathi, A., Maser, J., Fuoss, P. H.
2011; 36 (12): 2227-2229
- **Total-Reflection Inelastic X-Ray Scattering from a 10-nm Thick $\text{La}_{0.6}\text{Sr}_{0.4}\text{CoO}_3$ Thin Film** *PHYSICAL REVIEW LETTERS*
Fister, T. T., Fong, D. D., Eastman, J. A., Iddir, H., Zapol, P., Fuoss, P. H., Balasubramanian, M., Gordon, R. A., Balasubramanian, K. R., Salvador, P. A.
2011; 106 (3): 037401
- **The effect of exit beam phase aberrations on parallel beam coherent x-ray reconstructions** *REVIEW OF SCIENTIFIC INSTRUMENTS*
Hruszkewycz, S. O., Harder, R., Xiao, X., Fuoss, P. H.
2010; 81 (12): 123706
- **Polarization Switching without Domain Formation at the Intrinsic Coercive Field in Ultrathin Ferroelectric PbTiO_3** *PHYSICAL REVIEW LETTERS*
Highland, M. J., Fister, T. T., Richard, M., Fong, D. D., Fuoss, P. H., Thompson, C., Eastman, J. A., Streiffer, S. K., Stephenson, G.
2010; 105 (16): 167601
- **Synchrotron x-ray diffraction measurements of strain in metallic nanoparticles with oxide shells** *JOURNAL OF PHYSICS D-APPLIED PHYSICS*
Ingham, B., Hendy, S. C., Fong, D. D., Fuoss, P. H., Eastman, J. A., Lassesson, A., Tee, K. C., Convers, P. Y., Brown, S. A., Ryan, M. P., Toney, M. F.
2010; 43 (7)
- **Reversible Chemical Switching of a Ferroelectric Film** *PHYSICAL REVIEW LETTERS*
Wang, R. V., Fong, D. D., Jiang, F., Highland, M. J., Fuoss, P. H., Thompson, C., Kolpak, A. M., Eastman, J. A., Streiffer, S. K., Rappe, A. M., Stephenson, G. B.
2009; 102 (4): 047601
- **Particle size effect of hydrogen-induced lattice expansion of palladium nanoclusters** *PHYSICAL REVIEW B*
Ingham, B., Toney, M. F., Hendy, S. C., Cox, T., Fong, D. D., Eastman, J. A., Fuoss, P. H., Stevens, K. J., Lassesson, A., Brown, S. A., Ryan, M. P.
2008; 78 (24)
- **Spontaneous oscillations and waves during chemical vapor deposition of InN** *PHYSICAL REVIEW LETTERS*
Jiang, F., Munkholm, A., Wang, R., Streiffer, S. K., Thompson, C., Fuoss, P. H., Latifi, K., Elder, K. R., Stephenson, G. B.
2008; 101 (8): 086102

- **X-ray diffuse scattering measurements of nucleation dynamics at femtosecond resolution** *PHYSICAL REVIEW LETTERS*
Lindenberg, A. M., Engemann, S., Gaffney, K. J., Sokolowski-Tinten, K., Larsson, J., Hillyard, P. B., Reis, D. A., Fritz, D. M., ARTHUR, J., Akre, R. A., George, M. J., Deb, A., Bucksbaum, et al
2008; 100 (13)
- **Carrier-density-dependent lattice stability in InSb** *PHYSICAL REVIEW LETTERS*
Hillyard, P. B., Gaffney, K. J., Lindenberg, A. M., Engemann, S., Akre, R. A., ARTHUR, J., Blome, C., Bucksbaum, P. H., Cavalieri, A. L., Deb, A., Falcone, R. W., Fritz, D. M., Fuoss, et al
2007; 98 (12)
- **Ultrafast bond softening in bismuth: Mapping a solid's interatomic potential with X-rays** *SCIENCE*
Fritz, D. M., Reis, D. A., Adams, B., Akre, R. A., ARTHUR, J., Blome, C., Bucksbaum, P. H., Cavalieri, A. L., Engemann, S., Fahy, S., Falcone, R. W., Fuoss, P. H., Gaffney, et al
2007; 315 (5812): 633-636
- **Detectors for ultrafast X-ray experiments at SPPS** *SYNCHROTRON RADIATION INSTRUMENTATION, PTS 1 AND 2*
Siddons, D. P., Kuczewski, A. J., Yu, B., Warren, J., Rudati, J., Fuoss, P., Hastings, J. B., Kaspar, J. D., Meyer, D. A.
2007; 879: 1176-?
- **Stabilization of monodomain polarization in ultrathin PbTiO₃ films** *PHYSICAL REVIEW LETTERS*
Fong, D. D., Kolpak, A. M., Eastman, J. A., Streiffer, S. K., Fuoss, P. H., Stephenson, G. B., Thompson, C., Kim, D. M., Choi, K. J., Eom, C. B., Grinberg, Rappe, A. M.
2006; 96 (12): 127601
- **Observation of structural anisotropy and the onset of liquidlike motion during the nonthermal melting of InSb** *PHYSICAL REVIEW LETTERS*
Gaffney, K. J., Lindenberg, A. M., Larsson, J., Sokolowski-Tinten, K., Blome, C., Synnergren, O., Sheppard, J., Caleman, C., MacPhee, A. G., Weinstein, D., Lowney, D. P., Allison, T., Matthews, et al
2005; 95 (12)
- **Atomic-scale visualization of inertial dynamics** *SCIENCE*
Lindenberg, A. M., Larsson, J., Sokolowski-Tinten, K., Gaffney, K. J., Blome, C., Synnergren, O., Sheppard, J., Caleman, C., MacPhee, A. G., Weinstein, D., Lowney, D. P., Allison, T. K., Matthews, et al
2005; 308 (5720): 392-395
- **Clocking femtosecond x rays** *PHYSICAL REVIEW LETTERS*
Cavalieri, A. L., Fritz, D. M., Lee, S. H., Bucksbaum, P. H., Reis, D. A., Rudati, J., Mills, D. M., Fuoss, P. H., Stephenson, G. B., Kao, C. C., Siddons, D. P., Lowney, D. P., MacPhee, et al
2005; 94 (11)
- **In situ synchrotron X-ray studies of ferroelectric thin films**
Fong, D. D., Eastman, J. A., Stephenson, G. B., Fuoss, P. H., Streiffer, S. K., Thompson, C., Auciello, O.
INT UNION CRYSTALLOGRAPHY.2005: 163-167
- **Ferroelectricity in ultrathin perovskite films** *SCIENCE*
Fong, D. D., Stephenson, G. B., Streiffer, S. K., Eastman, J. A., Auciello, O., Fuoss, P. H., Thompson, C.
2004; 304 (5677): 1650-1653
- **Silicon-induced faceting of vicinal GaAs(001)** *JOURNAL OF APPLIED PHYSICS*
Brennan, S., Stephenson, G. B., Fuoss, P. H., Kisker, D. W., Lavoie, C., Evans-Lutterodt, K. L.
2000; 88 (6): 3367-3376
- **Optical characterization of surfaces during epitaxial growth using RDS and GIXS** *JOURNAL OF CRYSTAL GROWTH*
Kamiya, I., Mantese, L., Aspnes, D. E., Kisker, D. W., Fuoss, P. H., Stephenson, G. B., Brennan, S.
1996; 163 (1-2): 67-77
- **Atomic scale studies of epitaxial growth processes using X-ray techniques**
Kisker, D. W., Stephenson, G. B., Tersoff, J., Fuoss, P. H., Brennan, S.
ELSEVIER SCIENCE BV.1996: 54-59

- **Investigation of the relationship between reflectance difference spectroscopy and surface structure using grazing incidence X-ray scattering**
Kisker, D. W., Stephenson, G. B., Kamiya, Fuoss, P. H., Aspnes, D. E., Mantese, L., Brennan, S.
AKADEMIE VERLAG GMBH.1995: 9-21
- **IN-SITU X-RAY STUDIES OF ORGANOMETALLIC VAPOR-PHASE EPITAXY GROWTH MATERIALS SCIENCE AND ENGINEERING B-SOLID STATE MATERIALS FOR ADVANCED TECHNOLOGY**
Fuoss, P. H., Kisker, D. W., Stephenson, G. B., Brennan, S.
1995; 30 (2-3): 99-108
- **CHARACTERIZATION OF VAPOR-PHASE GROWTH USING X-RAY TECHNIQUES**
KISKER, D. W., STEPHENSON, G. B., FUOSS, P. H., BRENNAN, S.
ELSEVIER SCIENCE BV.1995: 104-111
- **GAAS C(4X4) SURFACE-STRUCTURE IN ORGANOMETALLIC VAPOR-PHASE EPITAXY PHYSICAL REVIEW B**
Payne, A. P., Fuoss, P. H., Kisker, D. W., Stephenson, G. B., Brennan, S.
1994; 49 (20): 14427-14434
- **X-RAY-SCATTERING ANALYSIS OF SURFACE-STRUCTURES PRODUCED BY VAPOR-PHASE EPITAXY OF GAAS PHYSICAL REVIEW B**
Lamelas, F. J., Fuoss, P. H., Kisker, D. W., Stephenson, G. B., Imperatori, P., Brennan, S.
1994; 49 (3): 1957-1965
- **TIME-RESOLVED X-RAY-SCATTERING STUDIES OF LAYER-BY-LAYER EPITAXIAL-GROWTH PHYSICAL REVIEW LETTERS**
Fuoss, P. H., Kisker, D. W., Lamelas, F. J., Stephenson, G. B., Imperatori, P., Brennan, S.
1992; 69 (19): 2791-2794
- **ATOMIC SCALE CHARACTERIZATION OF ORGANOMETALLIC VAPOR-PHASE EPITAXIAL-GROWTH USING INSITU GRAZING-INCIDENCE X-RAY-SCATTERING**
KISKER, D. W., STEPHENSON, G. B., FUOSS, P. H., LAMELAS, F. J., BRENNAN, S., IMPERATORI, P.
ELSEVIER SCIENCE BV.1992: 1-9
- **GALLIUM-ARSENIDE SURFACE RECONSTRUCTIONS DURING ORGANOMETALLIC VAPOR-PHASE EPITAXY APPLIED PHYSICS LETTERS**
Lamelas, F. J., Fuoss, P. H., Imperatori, P., Kisker, D. W., Stephenson, G. B., Brennan, S.
1992; 60 (21): 2610-2612
- **X-RAY-SCATTERING STUDIES OF INTERMEDIATE-RANGE ORDER IN AMORPHOUS GESE2 JOURNAL OF NON-CRYSTALLINE SOLIDS**
FISCHERCOLBRIE, A., FUOSS, P. H.
1990; 126 (1-2): 1-34
- **EXPERIMENTAL CONSIDERATIONS FOR INSITU X-RAY-SCATTERING ANALYSIS OF OMVPE GROWTH 6TH NATIONAL CONF ON SYNCHROTRON RADIATION INSTRUMENTATION**
Brennan, S., Fuoss, P. H., Kahn, J. L., Kisker, D. W.
ELSEVIER SCIENCE BV.1990: 86-92
- **X-RAY-ANALYSIS OF GAAS SURFACE RECONSTRUCTIONS IN H2 AND N2 ATMOSPHERES APPLIED PHYSICS LETTERS**
Kisker, D. W., Fuoss, P. H., TOKUDA, K. L., Renaud, G., Brennan, S., Kahn, J. L.
1990; 56 (20): 2025-2027
- **INSITU CHARACTERIZATION OF ORGANOMETALLIC GROWTH OF ZNSE USING GRAZING-INCIDENCE X-RAY-SCATTERING 4TH INTERNATIONAL CONF ON II-VI COMPOUNDS (II-VI-89)**
Kisker, D. W., Fuoss, P. H., Brennan, S., Renaud, G., TOKUDA, K. L., Kahn, J. L.
ELSEVIER SCIENCE BV.1990: 42-47
- **SURFACE SENSITIVE X-RAY-SCATTERING ANNUAL REVIEW OF MATERIALS SCIENCE**
Fuoss, P. H., Brennan, S.
1990; 20: 365-390
- **ATOMIC NATURE OF ORGANOMETALLIC-VAPOR-PHASE-EPITAXIAL GROWTH PHYSICAL REVIEW LETTERS**
Fuoss, P. H., Kisker, D. W., Renaud, G., TOKUDA, K. L., Brennan, S., Kahn, J. L.
1989; 63 (21): 2389-2392

- **THE SI(001)/SiO₂ INTERFACE** *APPLIED SURFACE SCIENCE*
OURMAZD, A., FUOSS, P. H., BEVK, J., MORAR, J. F.
1989; 41-2: 365-371
- **Hg₁-XCDXTE/Hg₁-XZNXTE SUPERLATTICES WITH CONSTANT Hg CONTENT** *APPLIED PHYSICS LETTERS*
Feldman, R. D., Fuoss, P. H., Austin, R. F., Kahn, J. L., Norton, L. J., Brennan, S.
1989; 54 (15): 1466-1468
- **STRUCTURE AND BONDING IN PHOTODIFFUSED AMORPHOUS Ag-GeSe₂ THIN-FILMS** *PHYSICAL REVIEW B*
FISCHERCOLBRIE, A., Bienenstock, A., Fuoss, P. H., Marcus, M. A.
1988; 38 (17): 12388-12403
- **STRUCTURE OF ALPHA-GeSe₂ FROM X-RAY-SCATTERING MEASUREMENTS** *PHYSICAL REVIEW B*
FUOSS, P. H., FISCHERCOLBRIE, A.
1988; 38 (3): 1875-1878
- **X-RAY-SCATTERING STUDIES OF THE MELTING OF LEAD SURFACES** *PHYSICAL REVIEW LETTERS*
Fuoss, P. H., Norton, L. J., Brennan, S.
1988; 60 (20): 2046-2049
- **X-RAY-SCATTERING STUDIES OF THE SI-SiO₂ INTERFACE** *PHYSICAL REVIEW LETTERS*
Fuoss, P. H., Norton, L. J., Brennan, S., FISCHERCOLBRIE, A.
1988; 60 (7): 600-603
- **PHASE-SEPARATION IN Cd₁-XZNXTE GROWN BY MOLECULAR-BEAM EPITAXY** *JOURNAL OF VACUUM SCIENCE & TECHNOLOGY B*
Feldman, R. D., Austin, R. F., Fuoss, P. H., DAYEM, A. H., WESTERWICK, E. H., Nakahara, S., Boone, T., Menendez, J., Pinczuk, A., Valladares, J. P., Brennan, S.
1987; 5 (3): 690-693
- **STRUCTURAL STUDIES OF AMORPHOUS MATERIALS USING SYNCHROTRON RADIATION AND ANOMALOUS SCATTERING**
Bienenstock, A., FISCHERCOLBRJE, A., Kortright, J., Lorentz, R., Ludwig, K., Warburton, W., Wilson, L., Fuoss, P.
WILEY-BLACKWELL. 1984: C399-C399
- **X-RAY RDF ANALYSIS OF 1500 Å THICK AMORPHOUS FILMS** *JOURNAL OF NON-CRYSTALLINE SOLIDS*
FISCHERCOLBRIE, A., FUOSS, P. H.
1983; 59-6 (DEC): 859-862
- **APPLICATION OF DIFFERENTIAL ANOMALOUS X-RAY-SCATTERING TO STRUCTURAL STUDIES OF AMORPHOUS MATERIALS** *PHYSICAL REVIEW LETTERS*
Fuoss, P. H., Eisenberger, P., Warburton, W. K., Bienenstock, A.
1981; 46 (23): 1537-1540
- **A PHASE-DIFFERENCE APPROACH TO EXAFS ANALYSIS OF GERMANIUM POLYMORPHS** *ACTA CRYSTALLOGRAPHICA SECTION A*
KAWAMURA, T., SHIMOMURA, O., FUKAMACHI, T., FUOSS, P. H.
1981; 37 (SEP): 653-658
- **ANOMALOUS SCATTERING DETERMINATIONS OF THE PAIR DISTRIBUTION-FUNCTIONS IN AMORPHOUS GeSe** *JOURNAL OF NON-CRYSTALLINE SOLIDS*
Fuoss, P. H., Warburton, W. K., Bienenstock, A.
1980; 35-6 (JAN-): 1233-1238