

Patrick J. Neyman

pneyman@vt.edu

509 Jane Randolph St., Forest, VA 24551

(540) 818-6599

EDUCATION: Ph. D. Macromolecular Science & Engineering (Physics), July 2004

Virginia Polytechnic Institute & State University, J. R. Heflin, advisor

Research: Linear and nonlinear optics of nano-scale multilayer polymer & hybrid-polymer films,
Novel development and investigation techniques, Internal structure determination,
Electro-optic device development

M. S. Materials Science & Engineering, May 2002

Virginia Polytechnic Institute & State University, J. R. Heflin, advisor

Research: Nonlinear optics of nanometer scale multilayer polymer films,
Film formation kinetics, Morphological modeling, Structure control

B. S. Physics, May 1999

Virginia Polytechnic Institute & State University

Minor in Mathematics, Emphasis in Computer Science

ACADEMIC HONORS:

- *Sigma Pi Sigma* Honor Society of the American Institute of Physics (1999)
- *Phi Theta Kappa* Honor Society (1996)
- Lubna Ijaz Scholarship for Commitment and Service to Physics (1998)

SELECTED EXPERIENCE:

1997 – Present: Nonlinear Optics Laboratory, Department of Physics, Virginia Tech, Blacksburg, Virginia

- Operated and maintained nanosecond and picosecond Nd:YAG laser systems
- Designed automated apparatuses and software for data acquisition, using Borland C
- Designed variable angle, variable polarization spectrophotometer for linear dichroism
- Programmed data analysis and 3-D modeling software, using Mathematica 4.0 with C++
- Analyzed and fabricated nanoscale self-assembled polymer films for electro-optic applications
- Fabricated photo-diodes and light emitting diodes using fullerene-polymer thin films
- Designed wet labs for manual and automated self-assembled film fabrication

1999, Summer: Luna Innovations, Blacksburg, Virginia

- Fabricated and characterized thin films for electro-optic applications

1997 – 1998: Department of Computer Science, Virginia Tech, Blacksburg, Virginia

- Designed Physics web site for the *Networked Infrastructure for Education* project

1990 – 1993: Special Products and Integrated Services, Framatome, Lynchburg, Virginia Non-Destructive Evaluation (NDE): Eddy-Current Testing (ET)

- Certified ET Level II: *American Society for Non-Destructive Testing* SNT-TC-1A
- Certified ET Level I: *Canadian General Standards Board* CAN/CGSB-48.9712
- Inspected thin walled tubing in steam generators at several nuclear power plants
- Directly Supervised by the *United States Nuclear Regulatory Commission* and the *Canadian Ministry of Natural Resources*

MILITARY: 82nd Airborne Division, U. S. Army, Fort Bragg, North Carolina Squad Leader, Airborne Infantry, 1986-1990, 1991

- Participated in Operation Desert Storm and Operation Just Cause
- Managed, trained and directed work assignments for nine personnel
- Graduated with Honors from the Non-Commissioned Officer Academy

RELATED EXPERIENCE:

Graduate Instructing Experience:

- *Optics Laboratory*, Senior Physics
- *Electronics Laboratory*, Junior Physics
- *Quantum and Solid State Physics*, Junior Physics
- *Astrophysics*, Junior Physics
- *Electricity and Magnetism Laboratory*, Sophomore Physics
- *Mechanics Laboratory*, Sophomore Physics

Relevant Graduate Coursework:

Adhesion Science, Polymer Viscoelasticity, Polymer Fracture and Deformation, Macromolecular Synthesis and Characterization Laboratory, X-Ray Diffraction, Mechanical Behavior of Materials, Advanced Materials Thermodynamics, Nonlinear Optics, Quantum Electronics, Quantum Mechanics, Electrodynamics

Selected Equipment Proficiency:

- Nd:YAG laser systems, Spectrometers, Spectrophotometers, Pyrometers, Electrometers, Lock-in amplifiers, Ellipsometers, DMA, DTMA, Instron Machines, Vacuum deposition systems, Spin coating systems, ROGER and COBRA manipulators, MIZ-18 and MIZ-24 data acquisition systems
- Optical system design, Photo-diode evaluation system design, Electronic evaluation system design, CAMAC system design, LAN design

Selected Software and Programming Language Proficiency:

- C, C++, Visual C++, UNIX, HTML, BASIC
- Excel, Word, PowerPoint, Acrobat, Photoshop, Premier, CorelDraw
- Mathematica, Origin, Psi Plot, Table Curve, Jasco Spectra Manager & Standard Analysis, CS ChemDraw, CS Chem3D
- CAMAC, ZETEC SM-10 and SM-20 acquisition and analysis software

MEMBERSHIPS:

American Chemical Society, since 2000
Materials Research Society, since 1999
Sigma Pi Sigma, since 1998
Phi Theta Kappa, since 1996
Society of Physics Students, 1987-2000
82nd Airborne Division Association, 1987-1991
Association of the United States Army, 1986-1991

DISTANCE LEARNING:

Outreach Program, Virginia Tech, 1997-1999
Mentored rural high-school students in Physics

Publications:

- 1. Second-Order Nonlinear Optical Properties of Ionically Self-Assembled Films Containing Dianionic Chromophores,**
P.J. Neyman, M.T. Guzy, S. Shah, H. Wang, H.W. Gibson, K.E. Van Cott, R.M. Davis, C. Figura, J.R. Heflin,
Polym. Mater. Sci. Eng. (Am. Chem. Soc.) **83**, pp. 162-163 (2000).
- 2. Thermal Stability and Immersion Solution Dependence of Second Order Nonlinear Optical Ionically Self-Assembled Films,**
C. Figura, P.J. Neyman, D. Marciu, C. Brands, M.A. Murray, S. Hair, R.M. Davis, M.B. Miller, and J.R. Heflin,
SPIE Proc. **3939**, pp. 214-222 (2000).
- 3. In Situ Second Harmonic Generation Measurements of the Formation of Ionically Self-Assembled Monolayers,**
C. Brands, P.J. Neyman, M.T. Guzy, S. Shah, H. Wang, H.W. Gibson, K.E. Van Cott, R.M. Davis, C. Figura, J.R. Heflin,
Polym. Mater. Sci. Eng. (Am. Chem. Soc.) **83**, pp. 219-220 (2000).
- 4. Control of Second-Order Nonlinear Optical Susceptibility in Ionically Self-Assembled Films by pH and Ionic Strength,**
C. Figura, P.J. Neyman, D. Marciu, C. Brands, M.A. Murray, S. Hair, M.B. Miller, R.M. Davis, J.R. Heflin,
Elec. Opt. & Mag. Prop. of Sol. State Mat V. (M.R.S. Symp. Proc.) **598**, BB4.9.1-6 (2000).
- 5. Photovoltaic Responses in Ionically Self-Assembled Nanostructures Containing Conjugated Polymers And Fullerenes,**
C. Brands, T. Piok, P.J. Neyman, A. Erlacher, C. Soman, M.A. Murray, R. Schroeder, J.R. Heflin, W. Graupner, D. Marciu, A. Drake, M.B. Miller, H. Wang, H. Gibson, H.C. Dorn, G. Leising, M. Guzy, R.M. Davis,
SPIE Proc. **3937**, pp. 51-62 (2000).
- 6. Efficient Charge Generation in Conjugated Molecules,**
W. Graupner, T. Piok, C. Brands, P.J. Neyman, A. Erlacher, C. Soman, M.A. Murray, R. Schroeder, J.R. Heflin, D. Marciu, A. Drake, M.B. Miller, H. Wang, H. Gibson, H.C. Dorn, G. Leising, M. Guzy, R.M. Davis,
Polym. Mater. Sci. Eng. (Am. Chem. Soc.) **83**, pp. 284-285 (2000).

Publications:

7. **Efficiency Optimization in Ionically Self-Assembled Thin Film Polymer Light-Emitting Diodes,**
D. Marciu, M.B. Miller, A.L. Ritter, M.A. Murray, P.J. Neyman, W. Graupner, J.R. Heflin, H. Wang, H.W. Gibson, R.M. Davis,
SPIE Proc. **3938**, pp. 169-179 (2000).
8. **Characterization of Polymer Light-Emitting Diodes Fabricated by Ionically Self-Assembled Monolayer Technique,**
D. Marciu, M.B. Miller, J.R. Heflin, M.A. Murray, A.L. Ritter, P.J. Neyman, W. Graupner, H. Wang, H.W. Gibson, R.M. Davis,
Elec. Opt. & Mag. Prop. of Sol. State Mat V. (M.R.S. Symp. Proc.) **598**, BB11.50.1-6 (2000).
9. **Second Order Nonlinear Optical Responses of Ionically Self-Assembled Films: Polycation Variations and Dianionic Chromophores,**
P.J. Neyman, M. Guzy, S. Shah, R.M. Davis, K.E. Van Cott, H. Wang, H.W. Gibson, C. Brands, J.R. Heflin,
Linear and Nonlinear Optics of Organic Materials (SPIE Proc.) **4461**, pp. 214-225 (2001) (Invited).
10. **Enhanced Second Order Nonlinear Optical Susceptibilities in Ionically Self-Assembled Films Incorporating Dianionic Molecules,**
P.J. Neyman, M.T. Guzy, S. Shah, K.E. Van Cott, R.M. Davis, H. Wang, H.W. Gibson, C. Brands, J.R. Heflin,
Org. Elec. & Phot. Mater. & Dev. (Mater. Res. Soc. Symp. Proc.) **660**, JJ8.30.1-6 (2001).
11. **In Situ Second Harmonic Generation Measurements of the Growth of Nonlinear Optical Ionically Self-Assembled Monolayers,**
C. Brands, P.J. Neyman, M. Guzy, S. Shah, R.M. Davis, K.E. Van Cott, H. Wang, H.W. Gibson, J.R. Heflin,
Linear and Nonlinear Optics of Organic Materials (SPIE Proc.) **4461**, pp. 311-318 (2001).
12. **Photovoltaic Cells Based on Ionically Self-Assembled Nanostructures,**
T. Piok, C. Brands, P.J. Neyman, A. Erlacher, C. Soman, M.A. Murray, R. Schroeder, W. Graupner, J.R. Heflin, D. Marciu, A. Drake, M.B. Miller, H. Wang, H. Gibson, H.C. Dorn, G. Leising, M. Guzy, R.M. Davis,
Synthetic Metals **116** (1-3), pp. 343-347 (2001).

Publications:

13. **In-Situ Second Harmonic Generation Measurements of the Growth of Nonlinear Optical Susceptibility in Ionically Self-Assembled Monolayers,**
C. Brands, P.J. Neyman, M. T. Guzy, S. Shah, K.E. Van Cott, R.M. Davis, H. Wang, H.W. Gibson, J.R. Heflin,
Org. Elec. & Phot. Mater. & Dev. (Mater. Res. Soc. Symp. Proc.) **660**, JJ8.32.1-6 (2001).
14. **Second-Order Nonlinear Optical Properties of Ionically Self-Assembled Films,**
H.W. Gibson, M. Guzy, S. Shah, H. Wang, P.J. Neyman, K. Van Cott, R.M. Davis, C. Figura, J.R. Heflin,
Polym. Mater. Sci. Eng. (Am. Chem. Soc.) **84**, 251-252, (2001).
15. **Nonlinear Optical Properties and Structural Characteristics of Self-Assembled Nanoscale Polymer Films by Ionic Concentration and Incorporation of Monomer Chromophores,**
P. J. Neyman,
Thesis, Master of Science, Materials Science and Engineering,
(Virginia Polytechnic Institute & State University), (May, 2002).
16. **In-Situ Measurement of the Second Harmonic Signal of Adsorbing Nonlinear Optical Ionically Self-Assembled Monolayers,**
C. Brands, P.J. Neyman, M.T. Guzy, S. Shah, K.E. Van Cott, R.M. Davis, H. Wang, H.W. Gibson, J.R. Heflin,
Self-Assembly Proc. in Mater. (Mater. Res. Soc. Symp. Proc.) **707**, 313-318, (2002);
Poly. Int. & Thin Films (Mater. Res. Soc. Symp. Proc.) **710**, 201-206, (2002).
17. **Hybrid Covalent / Ionic Self-Assembly of Organic Second Order Nonlinear Optical Films,**
J.R. Heflin, P.J. Neyman, C. Brands, M. Guzy, S.M. Shah, H. Wang, H.W. Gibson, R.M. Davis, K.E. Van Kott,
Org. Thin Films for Photonic App. (OSA Trends in Opt. and Phot.), **64**, 3-8, (2002).
18. **Hybrid Covalent / Ionic Self-Assembly of Organic Second Order Nonlinear Optical Films,**
J.R. Heflin, P.J. Neyman, C. Brands, M. Guzy, S.M. Shah, H.Wang, H.W. Gibson, R.M. Davis, K.E. Van Kott,
Nonlinear Optics (OSA Trends in Optics and Photonics), **79**, 299-300, (2002).

Publications:

19. **Novel Hybrid Covalent / Ionic Self-Assembly Technique for Improved Second-Order Nonlinear Optical Films,**
P.J. Neyman, M. Guzy, S.M. Shah, R.M. Davis, K.E. Van Kott, H. Wang, H.W. Gibson, C. Brands, J.R. Heflin,
Org. Optoelec. Mater., Proc. & Dev. (Mater. Res. Soc. Symp. Proc.) **708**, 161-166, (2002).
20. **Novel Hybrid Covalent / Ionic Self-Assembly Technique for Improved Second-Order Nonlinear Optical Films,**
P.J. Neyman, M. Guzy, S.M. Shah, R.M. Davis, K.E. Van Kott, H. Wang, H.W. Gibson, C. Brands, J.R. Heflin,
Polym. Chem. (Am. Chem. Soc.), **43**(2), 560-561, (2002).
21. **Layer-by-Layer Deposition and Ordering of Low Molecular Weight Dye Molecules for Second Order Nonlinear Optics,**
K. Van Kott, M. Guzy, P. Neyman, C. Brands, J.R. Heflin, H.W. Gibson, R.M. Davis,
Angew. Chem. Int. Ed. **41**(17), 3236-3238, (2002);
Corrigendum: *Angew. Chem. Int. Ed.* **41**(19), 3719, (2002).
22. **Hybrid Reactive / Electrostatic Self-Assembly of Organic Polar Multilayers for Second Order Nonlinear Optics,**
P. J. Neyman, C. Brands, J. R. Heflin, M. Guzy, R. M. Davis, K. E. Van Cott, H. Wang, H.W. Gibson,
Optoelectronics and Hybrid Technologies (Mater. Res. Soc. Symp. Proc.), K9.1, (2003).
23. **Active Photonic Crystal Devices in Self-Assembled Electro-Optic Polymeric Materials,**
J. Li, P. J. Neyman, M. Vercellino, J. R. Heflin, R. Duncan, S. Evoy,
New Mater. for Dev. and Microelec. (Mater. Res. Soc. Symp. Proc.), **817**, L6.3, (2004).
24. **Second-Order Nonlinear Optical Characteristics of Nanoscale Self-Assembled Multilayer Organic Films,**
P. J. Neyman,
Dissertation, Doctor of Philosophy, Macromolecular Science and Engineering (Physics),
(Virginia Polytechnic Institute & State University), (June, 2004).
25. **Self-Assembled Organic Films**
M. Guzy, R. M. Davis, P. Neyman, C. Brands, J. R. Heflin, H. W. Gibson, K. E. Van Cott,
Encyclopedia of Nanoscience and Nanotechnology, J. A. Schwarz, ed., Marcel Dekker, Inc.,
New York (2004), ISBN: 0824747976.

REFEREED AND INVITED PRESENTATIONS:

- 1. Control of Second-Order Nonlinear Optical Susceptibility in Ionically Self-Assembled Films by pH and Ionic Strength,**
Molecular Electronics, Materials Research Society Fall Meeting
(Boston, MA, 30 November 1999).
- 2. Second-Order Nonlinear Optical Properties of Ionically Self-Assembled Monolayer (ISAM) Films,**
Condensed Matter Seminar, Department of Physics, Virginia Tech
(Blacksburg, VA, 10 November 1999) (*Invited*).
- 3. Second-Order Nonlinear Optical Properties of Ionically Self-Assembled Films Containing Dianionic Chromophores,**
Polymer Materials, American Chemical Society
(Washington D. C., 20 August 2000).
- 4. Characterization of Ionically Self-Assembled Monolayer (ISAM) Films by Second-Order Nonlinear Optical Susceptibility,**
Weekly Seminar, Department of Materials Science and Engineering, Virginia Tech
(Blacksburg, VA, 27 October 2000) (*Invited*).
- 5. Enhanced Second-Order Nonlinear Optical Susceptibilities in Ionically Self-Assembled Films Incorporating Dianionic Molecules,**
Organic Photonic Materials, Materials Research Society Fall Meeting
(Boston, MA, 29 November 2000).
- 6. Second Order Nonlinear Optical Responses of Ionically Self-Assembled Films Containing Dianionic Chromophores,**
Linear and Nonlinear Optics of Organic Materials, SPIE
(San Diego, CA, 2 August 2001) (*Invited*).
- 7. Novel Polar Self-Assembled Multilayers for Second-Order Nonlinear Optics,**
Organic Optoelectronic Materials, Processing, and Devices,
Materials Research Society Fall Meeting
(Boston, MA, 27 November 2001).
- 8. Novel Hybrid Covalent / Ionic Self-Assembly Technique for Improved Second-Order Nonlinear Optical Films,**
Polymer Chemistry, American Chemical Society
(Boston, MA, 20 August 2002).