

**BARRETT G. POTTER, JR.**

Materials Science and Engineering Department, Arizona Materials Laboratory,  
University of Arizona, 4715 E. Fort Lowell Rd.; Tucson, AZ 85712.

**Research and Professional Experience**

*April, 2006 to present:* **Professor**, Department of Materials Science and Engineering and the Department of Optical Sciences (joint appointment effective 2010), **University of Arizona**, Tucson, AZ.

**Research Activities:** Optical and electronic materials development and application: solution and physical vapor phase deposition of thin films and nanocomposites (oxides, inorganic-organic hybrids); nanostructured energy conversion and storage materials; photoactivated phenomena in glass and hybrid thin films including optically driven molecular assembly; thermal stability of complex oxide optical materials; environmental sensing; optical behavior of rare-earth-doped matrices and semiconductor quantum-dot ensembles; and optical spectroscopic methods for the investigation of linear and nonlinear materials phenomena. Support: DOE, DoD, national laboratory (PNNL, SNL), state agencies (Science Foundation Arizona), and private industry.

**Teaching:** Optical Spectroscopy of Materials, Processing of Optical Materials, Materials Selection for the Environment, Physics and Chemistry of Ceramics, Introduction to Materials Science and Engineering, Fiber Optic Materials and Fabrication Techniques (online via NSF ERC - CIAN) Faculty advisor (2003-2012): UA Chapter Keramos (Materials Science/Ceramic Engineering Honors and Service Organization).

*2003 to April, 2006:* **Associate Professor**, Department of Materials Science and Engineering, **University of Arizona**, Tucson, AZ. See above for description.

*2001 to 2003:* **Technical Manager of the Chemical Synthesis and Nanomaterials Department**, **Sandia National Laboratories**, Albuquerque, NM.

The department combined broad-based materials synthesis expertise in organic, inorganic and hybrid materials systems to address fundamental and applied R&D issues surrounding the design and realization of complex multifunctional materials for optical, electronic, biological, structural, catalytic and selective-molecular-binding applications. Initiated and coordinated strategic program development with technical staff to anticipate and satisfy materials needs for internal SNL customers and external government and private sector interests, including DOE program offices (e.g. BES, OIT, OTT), DARPA, DoD, private industry, and academic collaborations.

**Research Activities:** Initiated program to provide photoactuation of optical, chemical, structural and dynamic mechanical material properties through the intelligent design of composite materials including photoactive nanostructures. Application for patternable/programmable material properties via non-contact means.

1993 to 2001: Principal Member of the Technical Staff, Sandia National Laboratories, Albuquerque, NM.

Project management and Principal Investigator for research and development efforts spanning materials synthesis, optical and electronic characterization, device development, and computational simulation and modeling for large and medium scale programs, including: grain-scale simulation of PZT shock-wave response; development of inorganic, inorganic and hybrid (organic/inorganic) glass thin films with enhanced photosensitivity for rapid patterning of integrated photonics and microoptics; electrooptical behavior in ferroelectric thin film oxides; emission behavior in rare-earth doped thin films and bulk glasses.

1992 – 1993: Post-Doctoral Appointee, Sandia National Laboratories, Albuquerque, NM.  
(Temporary Assignment at **AT&T Bell Labs**, Murray Hill, NJ).

Synthesis, characterization, and fiberization of rare-earth doped fluoride glass for optical amplifier development. Activities included: fabrication of Pr<sup>3+</sup>-doped ZBLAN fluoride glass optical fiber preforms; new glass composition development of barium-indium-gallium (BIG) fluoride glasses; initiation of nano-phase host approach for rare-earth ion doping through selective doping of phosphate/silica glass nanocomposite thin films by sequential, RF-magnetron sputtering.

### **Professional Preparation**

1991 Ph.D. Materials Science and Engineering, University of Florida  
1987 M.S. Materials Science and Engineering, University of Florida  
1985 B.S. Ceramic Engineering, NYS College of Ceramics at Alfred University

### **Certificate in Computational Simulation (August, 1998):**

Joint Sandia National Laboratories (SNL)/University of New Mexico (UNM) one-year program in *advanced scientific computing and modeling*. Intensive, senior and graduate-level university study in various aspects of computational science and simulation. Courses/topics include: computational mechanics (finite element, finite difference, linear systems), high-performance scientific computing, C++ and Fortran 90 programming, data structures, parallel processing, and material simulation.

### **Professional Activities and Affiliations**

- Fellow: American Ceramic Society
- Editor of the Journal of Non. Cryst. Solids (2006 to present)
- Inorganic photovoltaics program coordinator and Technical Advisory Board member for Arizona Research Institute for Solar Energy (AzRISE).
- Nominations Committee, American Ceramic Society (ACerS) (2009-2012)
- Membership Committee, Materials Research Society (MRS) (2009-2011)
- Symposium Co-organizer: ACerS Glass and Optical Materials Division Spring Meeting, 2012 – Materials for Energy Technologies.
- Webcourse module development for NSF ERC (Center for Integrated Access Networks): Fiber Optic Materials, Fiber Fabrication, Attenuation Phenomena (2010).

- International Organizing Committee for the Optical Materials Symposia at SPIE Photonics West (2001-2010).
- Chair: Norbert J. Kriedl Award for Young Scholars Committee (ACerS Glass and Optical Materials Division) (2009-2011)
- Chair: Glass and Optical Materials Division (GOMD) of the American Ceramic Society (2006-2007).
- Executive Committee: Glass and Optical Materials Division (GOMD) (2003-2007)
- Chair: Program Committee: GOMD of ACerS (2004-2006)
- Member of the Editorial Advisory Board of the Journal of Non-Crystalline Solids (2001-2006)
- Conference Editor: Proceedings of Sixteenth University Conference on Glass Science, J. Non-Cryst. Sol., Vol. 349, 2004.
- Focus Session Organizer: “Materials for Photonic Applications,” ACerS Annual Meeting, Baltimore, MD, 2005.
- Focus Session Organizer: “Optical Sensing,” GOMD/International Symposium on Non-oxide Glasses Joint Meeting, November, 2004.
- Program Chair for GOMD Fall Meeting, Pittsburgh, PA, 2002.
- Organized Focus Sessions on Lanthanide-Doped Materials at the 1999 American Ceramic Society Annual Meeting.
- Organizer Linear and Nonlinear Optical Phenomena in Glass Symposium held at the 1997 Glass and Optical Materials Division of the American Ceramic Society Fall Meeting (Joint with OSA topical meetings).
- Initiated and co-organized the Synthesis and Application of Lanthanide-Doped Ceramics, Crystals and Glasses Symposium held at the 1995 American Ceramic Society Annual Meeting; co-edited proceedings of symposium.
- Member: American Ceramic Society (ACerS), Materials Research Society (MRS), National Institute of Ceramic (NICE) Engineers, Society of Photo-Optical Instrumentation Engineers (SPIE).
- Member of the Coalition for Excellence in Science Education (CESE).
- Instructor/Presenter of optics-based workshops at “Expanding Your Horizons” programs: 1999-2001.

### **Selected Publications**

- “Phase assembly and photoinduced current in CdTe-ZnO nanocomposite thin films,” R.J. Beal, J.B. Kana Kana, B.G. Potter, Appl. Phys. Lett. 101, 031102 (2012).
- “Interfacial effects on the optical behavior of Ge:ITO and Ge:ZnO nanocomposite films,” G. Shih, C.G. Allen, and B.G. Potter, Jr., Nanotechnology 23, 075203 (2012).
- “Nanoassembly control and optical absorption in CdTe:ZnO nanocomposite thin films,” B.G. Potter, Jr., R.J. Beal, and C.G. Allen, J. Appl. Phys. 111, 034305 (2012).
- “RF-sputtered Ge:ITO nanocomposite thin films for photovoltaic applications,” C.G. Allen, G. Shih, B.G. Potter, Solar Energy Materials & Solar Cells 94, 797–802 (2010).

- “Elevated-temperature structural transformation and optical transmission behavior of  $\text{KH}_2\text{PO}_4$  single crystals,” R. Beal, M. Kalva, and B.G. Potter, Jr., *J. Am. Ceram. Soc.*, 93 [4] 1089–1095 (2010).
- “Intrinsic Electronic Transitions of the Absorption Spectrum of  $(\text{OPy})_2\text{Ti}(\text{TAP})_2$ : Implications Toward Photostructural Modifications,” C.R. De Silva, J. David Musgraves, Z. Schneider, B.G. Potter, Jr., T. J. Boyle, K. Simmons-Potter, and L. Rene´ Corrales, *J. Phys. Chem. A* 113, 5598 (2009).
- “Nanostructure development in photo-deposited titania-based thin films,” J.D. Musgraves, B.G. Potter, Jr., and T.J. Boyle, *J. Mat. Res.* 24, 3372 (2009).
- “Direct fabrication of physical relief structures via patterned photodeposition of a titanium alkoxide solution,” J.D. Musgraves, B.G. Potter, Jr., T.J. Boyle, *Opt. Lett.* 33 1 (2008).
- “Photoprogrammable molecular hybrid materials for write-as-needed optical devices,” B.G. Potter, Jr., K. Simmons-Potter, H. Chandra, G.M. Jamison, and W.J. Thomes, *J. Non-cryst. Solids* 352, 2618 (2006).
- “Vacuum ultraviolet spectroscopy measurement of poly[(methyl)(phenyl)silylene] photosensitivity,” H. Chandra, B.G. Potter, Jr., G.M. Jamison, and W.J. Thomes, *J. Appl. Phys.* 102, 033110-1 (2007).
- “Preferential photostructural modification of heteroleptic titanium alkoxides for molecular assembly,” J.D. Musgraves, B.G. Potter Jr., R.M. Sewell, T.J. Boyle, *J. Mater. Res.* 22, 1694 (2007).
- “Photostructural Modifications in Poly(methylphenylsilylene) Thin Films: Excitation Wavelength and Atmosphere Dependence,” B.G. Potter, Jr., K. Simmons-Potter, H. Chandra, G.M. Jamison, W.J. Thomes, *J. Mat. Res.* 21 (9), 2393 (2006).
- “Optically Defined Multifunctional Patterning of Photosensitive Thin-Film Silica Mesophases,” D. Dhoshi, N.K. Huesing, M. Lu, H. Fan, K. Simmons-Potter, B.G. Potter, Jr., A.J. Hurd, C.J. Brinker, *Science* 290, 107 (2000).
- “Photosensitive and Rare-Earth Doped Ceramics for Optical Sensing: A Review,” B.G. Potter, Jr. and M.B. Sinclair, *invited paper*, *J. Electrocerams.* 2, 295 (1998).
- “Monte Carlo Simulation of Ferroelectric Domains in Two-Dimensions,” B.G. Potter, Jr., V. Tikare, and B.A. Tuttle, *J. Appl. Phys.* 87, 4415 (2000).
- “Photosensitive Point Defects in Optical Glasses : Science and Applications,” B.G. Potter, Jr. and K. Simmons-Potter, invited paper, *Nuc. Inst. Met. in Phys. Res. (NIM B)* 166-167, 771 (2000).
- “Thermal Stability of Photosensitive Bragg Gratings in Sputter Deposited Germanosilicate Glass,” B.G. Potter, Jr., K. Simmons-Potter, and T.D. Dunbar, *J. Non-cryst. Solids* 277, 114 (2000).
- “Photosensitive Thin Film Materials and Devices,” K. Simmons-Potter, B.G. Potter, Jr., D.C. Meister, and M.B. Sinclair, *J. Non-Cryst. Solids*, 239, 96 (1998).
- “Structure and Optical Properties of Rare-Earth Doped Zinc-Oxyhalide Tellurite Glasses,” D.L. Sidebottom, M.A. Hruschka, B.G. Potter, Jr., and R.K. Brow, *J. Non-Cryst. Solids* 222, 282 (1997).
- “Increased Radiative Lifetime of Rare-Earth-Doped Zinc Oxyhalide Tellurite Glasses,” D.L. Sidebottom, M.A. Hruschka, B.G. Potter, Jr., and R.K. Brow, *Appl. Phys. Lett.* 71, 1963 (1997).

- “Ionizing Radiation Response of Photosensitive Germanosilicate Thin Films: A New Radiation Sensor Strategy,” B.G. Potter, Jr., K. Simmons-Potter, and P.J. Brannon, *Elec. Lett.* 33, 1073 (1997).
- “Charge Trapping, Isolated Ge Defects, and Photosensitivity in Sputter-Deposited GeO<sub>2</sub>:SiO<sub>2</sub> Thin Films,” W.L. Warren, K. Simmons-Potter, B.G. Potter, Jr., and J.A. Ruffner, *Appl. Phys. Lett.* 69, 1453 (1996).
- “Grain-Oriented Ferroelectric Bismuth Titanate Thin Film Prepared from Acetate Precursor,” Y.X. Lu, D.T. Hoelzer, W.A. Schultz, B. Tuttle, B.G. Potter, Jr., *Mat. Sci. and Eng. B-Sol. State Mat.* 39, 41 (1996).
- “Quantum Confinement Effects on the Photoluminescence Spectra of CdTe Nanocrystallites, O.R. Ochoa, C. Colajacomo, E.J. Witkowski, J.H. Simmons, B.G. Potter, Jr., *Sol. State Commun.* 98, 717 (1996).
- “Novel Process for the Production of Large, Stable Photosensitivity in Glass Films,” K. Simmons-Potter, B.G. Potter, Jr., D.C. McIntyre, and P.D. Grandon, *Appl. Phys. Lett.* 68 (1995).
- “ECR plasma-assisted deposition of Al<sub>2</sub>O<sub>3</sub> with in-situ Er Doping,” J.C. Barbour, J.S. Custer, D.M. Follstaedt, B.G. Potter, Jr., and M.B. Sinclair, *J. Vac. Sci. Technol.* (1995).
- “Evaluation of Electrooptic Phenomena in Ferroelectric Thin Films Using Ellipsometric Techniques,” B.G. Potter, Jr., D. Dimos, M.B. Sinclair, and S. Lockwood, *Int. Ferroelec.* 11, 59 (1995).
- “Photo-Induced and Electrooptic Properties of (Pb,La)(Zr,Ti)O<sub>3</sub> Films for Optical Memories,” D. Dimos, B.G. Potter, Jr., M.B. Sinclair, B.A. Tuttle, and W.L. Warren, *Int. Ferroelec.* 5, 47 (1994).
- “Red Luminescence and Optical Absorption in GeO<sub>2</sub>-SiO<sub>2</sub> Sol-Gel-Derived Planar Waveguides,” K.D. Simmons, B.G. Potter, Jr., and G.I. Stegeman, *Appl. Phys. Lett.* 64, 2537 (1994).
- “Quantum Size Effects on the Band Edge of CdTe Clusters in Glass,” B.G. Potter, Jr., J.H. Simmons, C. Stanton and P. Kumar, *J. Appl. Phys.* 75, 8039 (1994).
- “Electrooptic Characterization of Pb(Zr,Ti)O<sub>3</sub> Thin Films by Waveguide Refractometry,” B.G. Potter, Jr., M.B. Sinclair and D. Dimos, *Appl. Phys. Lett.*, 63, 2180 (1993).
- “Quantum Confinement Effects at the L-Point in CdTe,” B.G. Potter, Jr. and J.H. Simmons, *Phys. Rev. B.* 43, 2234 (1991).
- “Quantum Confinement Effects in CdTe-Glass Composite Thin Films Produced Using RF-Magnetron Sputtering,” B.G. Potter, Jr. and J.H. Simmons, *J. Appl. Phys.* 68, 1218 (1990).

### **Patents:**

- Patent no. 6,593,062; “Formation of Bulk Refractive Index Structures,” issued: July, 15, 2003.
- Patent no. 6,368,775; “3-D Photo-Patterning of Refractive Index Structures in Photosensitive Thin Film Materials,” issued: April 9, 2002.
- Provisional Patent: December 2011 - “Method for non-contact assessment of electronic passivation layer quality.”
- Provisional Patent: October 2008 - “Direct photodeposition of patterned metal-oxide and molecular hybrid thin films from photosensitive alkoxide solutions.