

E Paul R. Berger, The Ohio State University

Professional Preparation

- **B.S.E.**, Engineering Physics, University of Michigan, Ann Arbor, 1985
- **M.S.E.**, Electrical Engineering, University of Michigan, Ann Arbor, 1987
- **Ph.D.**, Electrical Engineering, University of Michigan, Ann Arbor, 1990
- **Postdoctoral Fellow**, AT&T Bell Laboratories, Murray Hill, 1990 - 1992

Appointments

- **Visiting Professor**, Interuniversity Microelectronics Center (IMEC), Leuven, Belgium; 2008
- **Professor**, Dept. Elect. & Comp. Engin., The Ohio State University; 2003 – present
- **Courtesy Professor**, Dept. Physics, The Ohio State University; 2001 - present
- **Associate Professor**, Dept. Elect. Engin, The Ohio State University; 2000 - 2003
- **Visiting Professor**, Max-Planck-Institut für Polymerforschung, Mainz, Germany; 1999
- **Visiting Professor**, Cambridge Display Technology Ltd., Cambridge, UK; 1999
- **Associate Professor**, Dept. Elect. & Comp. Engin., University of Delaware; 1997 –2000
- **Assistant Professor**, Dept. Elect. Engin., University of Delaware; 1992 - 1997

Selected Major Awards and Distinctions

- **Faculty Diversity Excellence Award**, 2009
- **Lumley Research Award**, 2006
- **IEEE Faculty Advisor of the Year**, 2006
- **DARPA Excellence Award**, 1998
- **Senior Member**, IEEE, 1997
- **NSF CAREER Award**, 1996
- **Invited Speakers a numerous international conferences**

Current Research Interests:

- conjugated polymer-based flexible electronics and foldable optoelectronics and photovoltaics
- molecular electronics with quantum functional circuit elements using conjugated polymers
- Si-based resonant interband tunnel diodes for quantum functional circuitry to extend CMOS

Publication/Presentations: Total of ~90 refereed journal publications, 12 awarded patents and 5 more pending, (bold-faced are undergrad researchers)

1. “Plasmon-enhanced optical absorption and photocurrent in organic bulk heterojunction photovoltaic devices using self-assembled layer of silver nanoparticles” Woo-Jun Yoon *et al.*, *Solar Energy Materials & Solar Cells* (available online September 9, 2009).
2. “Efficient Organic Bulk Heterojunction Solar Cells through Near Infrared Absorbing Metallated Thiophene Complexes,” Woo-Jun Yoon *et al.*, *34th IEEE Photovoltaic Specialists Conference*, Philadelphia, PA (June 2009). ***Runner-up Best Poster Award.***
3. “Surface Modifications to the Indium Tin Oxide (ITO) Anodes Through Plasma Oxidized Silver for Efficient P3HT:PCBM (1:0.8) Bulk Heterojunction Photovoltaic Devices,” Woo-Jun Yoon and Paul R. Berger, *33rd IEEE Photovoltaic Specialists Conference*, San Diego, CA (May 11-16, 2008). ***Honorable Mention Award.***
4. “Enhanced Emission using Thin Li-Halide Cathodic Interlayers for Improved Injection into Poly(p-phenylene vinylene) derivative PLEDs,” Woo-Jun Yoon, ***Scott B. Orlove, Robert L. Olmon,*** and Paul R. Berger, *Electrochemical and Solid-State Letters*, **11**, pp. J76-J78 (2008).
5. “Plasma Polymerized Multistacked Organic Bipolar Films: A New Approach to Flexible High k-Dielectrics,” Dhiman Bhattacharyya, Woo-Jun Yoon, Paul R. Berger and Richard B. Timmons, *Advanced Materials*, **20**, pp. 2383-2388 (June 18, 2008).
6. “4.8% Efficient Poly(3-hexylthiophene)-Fullerene (1:0.8) Bulk Heterojunction Photovoltaic Devices with Plasma Treated AgO_x/ITO Anode Modification,” Woo-Jun Yoon and Paul R. Berger, *Applied Physics Letters*, **92**, 013306 (January 7, 2008).
7. “Analysis of Voltage Swing in Si/SiGe Resonant Interband Tunnel Diodes,” S-Y. Chung, N. Jin, ***R.E. Pavlovicz,*** P.R. Berger, R. Yu, and P.E. Thompson, *IEEE Trans. Nanotech.*, **6**, pp. 158-163 (March 2007).

8. "The Effect of Spacer Thickness on Si-based Resonant Interband Tunneling Diode Performance and their Application to Low-Power Tunneling Diode SRAM Circuits," N. Jin, S-Y. Chung, R. Yu, **R.M. Heyns**, P.R. Berger, and P.E. Thompson, *IEEE Trans. Electron Devices*, **53**, pp. 2243-2249 (September 2006).
9. "Integration of Si/SiGe HBT and Si-based RITD Demonstrating Controllable Negative Differential Resistance for Wireless Applications," S-Y. Chung, S-Y. Park, **J.W. Daulton**, R. Yu, P.R. Berger, and P.E. Thompson, *Solid State Elect.*, **50**, pp. 973-978 (June 2006).
10. "NMOS/SiGe Resonant Interband Tunneling Diode Static Random Access Memory," S. Sudirgo, **D.J. Pawlik**, S.K. Kurinec, P.E. Thompson, **J.W. Daulton**, S.Y. Park, R. Yu, P.R. Berger, and S.L. Rommel, *2006 Device Research Conference at Pennsylvania State University*, pp. 265-266 (June 2006).
11. "Next generation plastic low cost memory devices," Paul R. Berger, *Nano Electronics: Near term commercial applications for nanotechnology in electronics*, San Jose, California, (2006). **Invited Talk**.
12. "Room Temperature Negative Differential Resistance in Polymer Tunnel Diodes using a Thin Oxide Layer at the Anode and Demonstration of Threshold Logic," Woo-Jun Yoon, Sung-Yong Chung, Paul R. Berger, and **Sita M. Asar**, *Applied Physics Letters*, **87**, 203506 (November 14, 2005).
13. "High Electric Field Effects on Short Channel Polythiophene Polymer Field Effect Transistors," Yifan Xu and Paul R. Berger, *Journal of Applied Physics*, **95**, pp. 1497-1501 (February 1, 2004).

Synergistic Activities:

1. Heavy use of undergraduate researchers (60 total, not including 2 high school girls) over his academic career. This has lead to numerous undergraduates being co-authored, and even first-authored, on refereed scientific publications. Successfully recruited under-represented minorities and women to this pool of researchers (13 total). A number of undergraduate researchers have successfully gone onto graduate school either continuing here or elsewhere. One former undergraduate researcher is now an Associate Professor (Rommel) and another just completed his MSE degree. (Di Giacomo). Further, mentored an African-American Ph.D. graduate to become a Full Professor at an Historically Black College and Universities (HBCU).
2. **Created an interdisciplinary course on organic electronics and optoelectronics** (ECE 835.03) Past offerings have included a 50/50 blend of electrical engineers with physicists and chemists and serves as a guidepost for bridging the disciplines, bringing everyone together with a common vocabulary.
3. **Faculty Advisor to IEEE Student Chapter:** UDel (1993-2000), OSU (2000-present). Developed a weekly seminar series for ECE undergrads to be exposed to various areas of the ECE discipline before they specialize within their curriculum. Each week an upperclassman, graduate student, faculty and industrial representative share their thoughts and experiences. [**Faculty Advisor of the Year award, 2006**].
4. Conference Co-Chairman, "Ohio State University Polymer Consortium Review," in *Columbus, OH* (2004).

Collaborators over the Past 48 months: U.H.F. Bunz (Georgia Tech); M. Chisholm (OSU); A.J. Epstein (OSU); P. Fay (Notre Dame); K.D. Hirschman (RIT); S.K. Kurinec (RIT); N. Padture (OSU); S.L. Rommel (RIT); R.B. Timmons (Texas/Arlington); P.E. Thompson (NRL).

Graduate & Post-Doctoral Advisors: P.K. Bhattacharya (MSE & Ph.D.), and N.K. Dutta (Post-doc)

Current Students: (1) Ms. Anisha Ramesh, Ph.D. expected 2010; (2) Ms. Sheng Jiang, Physics Ph.D. expected 2012; (3) Min-Jae Kim, Ph.D. expected 2013; (4) Hyun Lee, REU (senior).

Total Current Graduate Students Advised: **3** **(2 under-represented)**
 Total Current Undergraduate Researchers: **1** **(0 under-represented)**

Former Advisees: (1) Si-Young Park (M.S.E. 2006, Ph.D. 2009); (2) Woo Jun Yoon, (M.S.E. 2006, Ph.D. 2009); (3) Ronghua Yu (Ph.D., Physics, 2007) (4) Sung-Yong Chung (M.S.E. 2002, , Ph.D. 2005, AMD); (5) Ms. Yifan Xu (M.S.E. 2002, Ph.D. 2005); (6) Sandro Di Giacomo (M.S.E. 2002, , Northrop-Grumman); (7) Niu Jin, (M.S.E. 2001, Ph.D. 2004, Illinois); (8) Anthony Rice (Hispanic, M.S.E. 2003, Battelle Memorial); (9) Sean L. Rommel, (Ph.D. 2000, RIT, Associate Professor); (10) John-Michael Taylor, (M.S.E., 1999, Naval Surface Warfare Center); (11) Hao Feng, (M.S.E.,1998, Hughes); (12) Ms. Xiaoping Shao, (Ph.D.,1997, Intel); (13) Michael McCarthy, (M.S.E.,1996, AMD); (14) Al-Sameen Tewfik Khan, (African-American, Ph.D., 1996, Delaware State, Full Professor); (15) Wei Gao, (Ph.D., 1995, Axcel Photonics, President).

Total Former Graduate Student Degrees Advised: **20** **(6 under-represented)**
 Total Former Undergraduate Researchers: **60** **(14 under-represented)**
 Total Former High School Researchers: **2** **(2 under-represented)**