

DANIEL SHIR

EDUCATION

University of Illinois at Urbana-Champaign, Urbana, IL

Ph.D., Materials Science and Engineering (3.67/4.0), May 2010

Advisor: Prof. **John A. Rogers**, member of the *National Academy of Engineering*, *IEEE* Fellow.

Pennsylvania State University, State College, PA

B.S., Materials Science and Engineering (3.76/4.0), *graduated with Distinction*, May 2005

PROFESSIONAL EXPERIENCE

University Of California at Los Angeles, Los Angeles, CA

Post-Doctoral Scholar, Prof. Aydogan Ozcan's research group, August 2014 – present

Intel Corporation, Hillsboro, OR

Product Engineer, Logic Technology Development, March 2012 – May 2014

- Developed test programs to assess the health of next generation processing technology.
- Led and drove the development and implementation of a data feed forward system to improve data transfer reliability and operational efficiency between different test stages.

Defect Reduction Engineer, Logic Technology Development, June 2010 – March 2012

- Initiated and led a team of more than ten senior engineers to reduce physical defects generated during semiconductor processing.
- Prioritized team focus based on the impact of each defect mode to the overall yield.
- Led and drove decision making to implement process changes to reduce overall defects counts by more than 100,000 times.
 - Identified key drivers for defect reduction through structured and data-driven analysis on thousands of interdependent data points.
 - Developed and implemented excursion prevention and response systems to improve operational effectiveness.

RESEARCH EXPERIENCE

University of Illinois Urbana-Champaign, Urbana, IL

Research Assistant, Department of Materials Science and Engineering, January 2006 - May 2010

Designed and developed novel approaches to overcome manufacturing challenges in nano-scale materials and applied the approaches to demonstrate high quality 3-D photonic crystals and large performance gains on solar photovoltaic and photonic devices.

- Published 10+ papers in high impact peer-reviewed scientific journals.
- Demonstrated up to 83% performance improvement in thin film silicon photovoltaic devices.
- Fabricated large-scale 3D nano-materials with one of the best optical properties ever reported.

Pennsylvania State University, State College, PA

Research Assistant, Department of Materials Science and Engineering, May 2004 - May 2005

Established models for silicon nanowires (SiNW) oxidation.

- Published research findings as first author in peer-reviewed journal.

TEACHING EXPERIENCE

University of Illinois Urbana-Champaign, Urbana, IL

Teaching Assistant, Department of Materials Science and Engineering, January 2006 - May 2007

Led and taught junior and senior level laboratory classes.

- Led the development of the first ever organic transistor lab for senior students at Univ. of Illinois.

RELEVANT TECHNICAL SKILLS

Experimental Techniques:

•Phase mask lithography	•E-beam lithography	•Conventional Photolithography	•AFM
•Nanoimprint lithography	•SEM	•Atomic layer deposition	•FTIR spectrometer
•RIE	•Ellipsometry	•Confocal microscopy	•E-beam deposition

Software Skills:

- MIT Photonic Bands (Plane wave expansion method for photonic band calculation)
- Gsolver & GD-Calc (RCWA) for diffraction grating calculation and 3D optical pattern simulation
- Matlab

FIRST-AUTHORED PEER-REVIEWED PUBLICATIONS

- Shir, D.**, Yoon, J., Ryu, J.H., and Rogers, J. A., "Performance of Ultrathin Silicon Solar Microcells with Nanostructures of Relief Formed by Soft Imprint Lithography for Broad Band Absorption Enhancement," *Nano letter* 10(8), 3041 (2010) .
- Shir, D.**, Nelson, E., Brzezinski, A. Chanda, D. Brzezinski, A., Braun, P. V., Wiltzius, P., and Rogers, J. A., "Dual exposure, two-photon, conformal phase mask lithography for three dimensional silicon inverse woodpile photonic crystals," *J. Vac. Sci. Technol. B* 28(4), 783 (2010)
- Campos, L. M., Truong, T., Shim, D. E., Dimitriou, M. D., **Shir, D.**, Meinel, I., Gerbec, J., Hahn, H. T., Rogers, J. A., and Hawker, G. J., "Applications of Thiol-ene Click Photocurable PMMS Stamps in Soft Lithography," *Chemistry of Materials* 21 5319 (2009).
- Lambeth, R. H., Park, J., Liao, H., **Shir, D.**, Jeon, S., Rogers, J.A., Moore, J.S., "Proximity Field Nanopatterning of AZopolymer Thin Films," *Nanotechnology* 21, 165301 (2010)
- Shir, D.**, Nelson, E., Chen, Y. C., Brzezinski, A., Liao, H., Braun, P. V., Wiltzius, P., Bogart, K. H. A., and Rogers, J. A., "Three Dimensional Silicon Photonic Crystals Fabricated by Two Photon Phase Mask Lithography," *Applied Physics Letters* 94, 011101 (2009)
- Shir, D.**, Liao, H., Jeon, S., Xiao, D., Johnson, H. T., Bogart, G. R., Bogart, K. H. A. and Rogers, J. A., "Three-Dimensional Nanostructures Formed by Single Step, Two-Photon Exposures through Elastomeric Penrose Quasicrystal Phase Masks," *Nano Letters* 8(8), 2236 (2008)
- Shir, D.**, Jeon, S., Liao, H., Highland, M., Cahill, DG., Su, M., El-Kady, I., Christodoulou, C., Bogart, G., Hamza, A., Rogers, JA., "Three Dimensional Nanofabrication With Elastomeric Phase Masks," *Journal of Physical Chemistry B* 111, 12945-12958 (2007).
- Nam, YS., Jeon, S., **Shir, D.**, Hamza, A., and Rogers, JA., "Thick, three-dimensional nanoporous densitygraded materials formed by optical exposures of photopolymers with controlled levels of absorption," *Applied Optics* 46, 6350-6354 (2007)
- Jeon, S., **Shir, D.**, Nam, YS., Nidetz, R., Highland, M., Cahill, DG., Rogers, JA., Su, M.F., El-kady, IF., Christodoulou, CG., and Bogart, G., "Molded Transparent Photopolymers and Phase Shift Optics for Fabricating Three Dimensional Nanostructures," *Optics Express* 15(10), 6358-6366 (2007)
- Menard, E., Meitl, M.A., Sun, Y., Park, J.-U., **Shir, D.**, Nam, YS., Jeon, S., and Rogers, JA., "Micro- and Nanopatterning Techniques for Organic Electronic and Optoelectronic Systems," *Chemical Reviews* 107, 1117-1160 (2007)
- Jeon, S., Nam, YS., **Shir, D.**, and Rogers, JA., "Three dimensional nanoporous density graded materials

formed by optical exposures through conformal phase masks,” *Applied Physics Letters* 89, 253101 (2006)
•**Shir, D.**, Liu, BZ., Lew, KK., Mohammad, A., and Mohny, SE., “Oxidation of Silicon Nanowires,”
Journal of Vacuum Science & Technology B 24 (3),1333-1336 (2006)

AWARDS

Divisional Award, Intel, Logic Technology Development, 2011

Hamer Fellowship, University of Illinois, 2005 - 2006

2nd Place, *2007 Nano-Photonics Workshop poster competition by Optical Society of America*, Urbana, IL, 2007

Graduated with Distinction, Pennsylvania State University, 2005