2007 C.V.

Omar D. Negrete

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Research Interests

My research is based on a combination of optical engineering, electronics, semiconductor device fabrication technology, and molecular biology. I use these fundamental elements of my education to develop new technologies as well as improve current strategies in the areas of light-directed DNA synthesis, DNA nanotechnology, and micro/nano patterning. The core my research activity is to pull together from these different areas to make advances in DNA microarray technology, synthetic biology, lithography, and molecular machinery.

Education

University of Wisconsin-Madison, WI.
PhD. candidate in Electrical and Computer Engineering
Focus: Biotechnology, DNA synthesis, Microarray fabrication, Micro/Nano-Fabrication, Optics.
Research: Development of a High-Throughput Maskless Array Synthesizer for Ultra-High Density Next Generation DNA Microarrays.
Advisor: Dr. Franco Cerrina
Fellowships: Graduate Engineering Research Scholars Fellowship (2004)
Genomic Sciences Training Program (2006-)

University of New Mexico-Albuquerque, NM.
B.S. Electrical and Computer Engineering (2003)
Focus: Opto-electronics, Biomedical Devices
Research: Research Project in a Computed Tomography Simulator in Matlab, advised by Dr. Marios Pattichis.
Design Project in Wireless Enabled Mobile Robotics with Localization Algorithms.
Scholarships: NM Lottery Scholarship, ECE Departmental Award,

Research Experience

Fall 2004-Present: *Research Assistant in the laboratory of Dr. Franco Cerrina*

- Demonstrated and drafted the blue print for a fully automated DNA Maskless Array Synthesizer (MAS) to generate 25 Mpixel chips. *Patent Pending*
- Currently conducting research to improve synthesis on current MAS systems for applications in Gene Synthesis by analyzing the contributions to errors in our synthesis from flare within the optical system.

- Currently investigating the integration of DNA origami techniques with light-directed DNA synthesis for scaleable and addressable nanostructures.

Summer 2001 – 2004: *Lab Assistant: Center for High Technology Materials in Albuquerque, N.M., Research Advisor: Dr. Steven R.J. Brueck*

- Characterized and designed a process for the fabrication of DFB gratings for mid-IR semiconductor lasers (in collaboration with Naval Research Laboratories).
- Synthesized periodic structures on glass and semiconducter substrates for the study of photonic crystals
- Created photoresist patterns to mimic hydrophobic surfaces found in plant life (in collaboration with Dr. Jeff Brinker).

Summer 2002*: Research Experience for Undergraduates (REU) program. Cornell University PI: Dr. Alan Bleier*

- I performed research with the electron beam lithography team at the Center for Nanofabrication Facility. I characterized Hydrogen Silesesquioxane (HSQ) for e-beam grayscale lithography by creating blazed gratings and microlens structures. Studied roughness properties with an AFM.

Related Skills

Optics: Photolithographic systems, Zemax modeling software, optical system design, interferometer setup and applications, fluorescent microscopy, Laser engineering.

Electronics: small circuit design for optical detectors, robotics, motion control systems, and electronic filters.

Fabrication: Lithography, Metal Evaporation and Sputtering Systems, RIE, ICP, Wet Etching, Oxidation systems, and some machine shop experience (e.g. wood-work and metal shaping tools).

Software: Matlab, Mathematica, ZEMAX, Silvaco Wafer Processing Software, Java, GIMP, Adobe Illustrator, Solid Works

Metrology: AFM and SEM.