CQN Integrated Optics for Undergraduate Native Americans

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Biomedical Sciences at Arizona State University

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Generation and Characterization of a human iPSC

ABSTRACT: The objective was to build a cell model that will help build the understanding of Pontocerebellar Hypoplasia Type 1B (PCH1B) using Induced Pluripotent Stem Cells (iPSCs). Pontocerebellar Hypoplasia Type 1B is a rare autosomal recessive genetic disease that causes muscle weakness and global development delay. Three blood samples were reprogrammed to be iPSCs. These samples were donated from a family of three: mother, father, and son. Where the son has been diagnosed with PCH1B and is the proband. Multiple tests were used to conform the cell line's identity and all results will be used to write a resource lab paper. To start off this project, I had to familiarize myself with iPSCs and PCH1B. Research was done to help my understanding and to write the introduction section of the resource paper. Next, I learned how to cell culture the iPSCs, this includes feeding and passing the cells. This was crucial because the cell lines needed to be heathy and strong enough to undergo testing. Lastly, two analyses were done to healthy cell lines to help characterize the iPSCs. All results will be added to the lab resource paper.

Mary Ann Clark

Earth, Oceans, and Atmosphere at University of Arizona
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An Alternative Material to Use for Infrared Optics

ABSTRACT: Infrared (IR) optics is used in different sectors of our daily lives. It is used in the motor vehicle industry to detect living beings on roadways, in National Security on the Mexican/ American boarder to detect people trying to cross the border, in the Defense sector to detect human activity, and may be used in the medical field. Currently, germanium (Ge) is being used for infrared optics. Ge is extremely expensive and becoming scarce, but it has a high refractive index. On the other hand, elemental sulfur (S8) is inexpensive, abundant, and also has a high refractive index. For this reason, the use of S8 in infrared optics is a great alternative to Ge.

Tommey Jodie

Prenutrional Sciences at University of Arizona

Mentored by Dr. Robert Norwood (Optical Sciences)

Photonic Devices for Sensor Applications

ABSTRACT: In this work, we used photonics to detect changes in its surrounding environment. I conducted my research with two photonic integrated circuits with fiber and free space optics. I characterized four different parameters of one chip: the Free Spectral Range (FSR), the Q factor, the insertion loss and the resonant wavelength. Temperature response measurements were measured using the second chip. Using the numbers and data we gathered, we were able to see how we could monitor these characteristics and how they fluctuate in various environments.

John Omnik

Mechanical Engineering at University of Alaska- Anchorage

Mentored by Dr. Dalziel Wilson (Optical Sciences)

Optical characterization of a photonic crystal dielectric slab

ABSTRACT: The purpose of this project is to explore the optical properties of a photonic crystal etched into a thin film silicon nitride dielectric slab with dimensions for a target wavelength of λ=850 nm. We will discuss the measurements made on two different photonic crystal slabs and compare them to unpatterned silicon nitride membranes. The ultimate goal for these experiments is to confirm 99% reflectance at the target wavelength.

Bre'Anna Sherman

Biochemistry and Biophysics at University of

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Nanofabrication of Photonic Crystal Micromirrors Using Wet and Dry Etching Techniques

ABSTRACT: The ability to control nanomechanical resonators with radiation pressure is the starting point for optomechanical quantum technologies. Towards this end, the UA Quantum Optomechanics group is designing a new class of ultra-low-mass micromirror by patterning a photonic crystal (PtC) into a silicon nitride membrane. The purpose of this project is to develop a recipe for releasing photonic crystal micromirrors suspended from millimeter-scale nanotethers. A key challenge is the extreme aspect ratio and tensile stress of the tethers, which make them highly susceptible to breakage at the interface with the PtC. We address this challenge by using a combination of dry and wet etching techniques which minimize the influence of turbulence, capillary, and thermal gradient forces. Ultimately the PtC mirrors will be integrated into optical cavities for applications such as quantum-limited accelerometry and electro-optic conversion.