21st Annual TLSAMP Undergraduate Research Conference

Poster Presentation Abstracts
(listed in alphabetical order)

1. **Bamlak Aklilu**
   Sophomore
   Department of Biomedical Engineering (Poster Presentation)
   Vanderbilt University
   Dr. Craig Duvall

Structural Optimization of siRNA Conjugates for Albumin Binding Achieves Effective MCL1-Directed Cancer Therapy

The Duvall lab specializof si4(a)4(l ord)-8(e)4(r))]TJETQq2eiclh9B5ginionc

2. **Betsy Akpotu**
   Senior
   Biology Computer Science (Poster Presentation)
   Middle Tennessee State University
   Dr. April Weissmiller, mentor

Generation of a c-JUN expression vector for rhabdoid cell line engineering

Malignant rhabdoid tumors are rare and aggressive childhood cancers with little to no treatment options available. The majority of rhabdoid tumors share a common mutation resulting in biallelic loss of the SMARCB1 gene that encodes the SNF5 protein subunit of the SWI/SNF chromatin remodeling complex. The SWI/SNF chromatin remodeling complex is responsible for regulation of gene expression through impacting DNA accessibility and therefore loss-of-function of the SMARCB1 gene results in changes to gene expression that cause tumorigenesis. Recently, it has been shown that in rhabdoid cancer cell lines the AP-1 transcription factor, which is composed of dimers between JUN and FOS family members, may potentially promote the cancerous state. Specifically, recent data point to a role for c-JUN being a critical family member that can modulate AP-1 function across the genome. The goal of this project was to create a c-JUN expression vector that can be used for cell line engineering so that the contribution of c-JUN to AP-1 functionality in rhabdoid cancer cell lines can be evaluated. Using a combination of molecular biology techniques, a portion of this process was accomplished, although further work will be needed to finalize the expression vector for human cell lines.

3. **Trinity Bissahoyo**
   Sophomore
   Computer Science (Poster Presentation)
   Dr. Rongjun Qin and Song Shuang
   University of Tennessee – Knoxville
   The Ohio State University - Geospatial Data Analytics Group
   Department of Civil, Environmental and Geodetic Engineering

Automating Image Selection Based on Image Quality Assessment for Stereo Reconstruction

3D modeling is often reconstructed from specified photos that take intensive time and resources to gather and review. It would be optimal to gather photos from crowdsourced images, saving time and money. However, the web creates the biggest image dataset as millions of photos are uploaded every day from various sources such as mobile devices, drones, CCTV, satellites, and other photo-capturing devices. Creating 3D models requires quality images that take time to go through manually. This research aims to develop an automated image selection system to help speed up photo quality distribution and improve the accuracy of 3D reconstruction. The images are analyzed using Real-Time Models for Object Detection (RTMDET) and distortion detection models including Multi-dimension Attention Network for Narious sources such as mobile deviceua0 1 7NW*02 re 4cy of 3D

4. **Michael Davis**
   Sophomore
   Engineering (Poster Presentation)
   Vanderbilt University
   Dr. Mahadevan-Jansen

   Characterizing biochemical and structural alterations in Eosinophilic Esophagitis

7. **Autumn Jones**
   Sophomore
   Biology

9. **Afrika Lewis**
   Junior
   Biology (Poster Presentation)
   LeMoyne-Owen College
   Dr. Moniruzzaman Syed Professor

Structural and Electronic Impact on Various Substrates of TiO2 Thin Film using Sol-Gel Spin Coating Method

Titanium dioxide (TiO2) thin film has been deposited on glass and silica substrates by using Sol-

11. Jamil Muhammad

Senior
Chemistry (Poster Presentation)
LeMoyne-Owen College
Dr. Moniruzzaman Syed Professor

Fabrication and Characterizations of Aluminum Doped Cadmium Oxide (CdO:Al) Thin Film using Sol-Gel Spin-Coating Method

Aluminum-doped cadmium oxide (CdO:Al) thin films are deposited on silica substrates by the sol–gel spin-coating method as a function of spin coater's rpm (revolution per minute). Cadmium acetate dihydrate and Aluminum nitrate have been taken as the precursor material and a source of Al-dopant respectively. CdO:Al thin films are characterized by Raman spectroscopy (Raman), x-ray diffraction (XRD), Fourier Transform Infrared (FT/IR), Field emission scanning electron microscopy (FE-SEM) and SEM-EDX. Raman and XRD results indicate the highest crystallinity at 6000 rpm with a XRD crystallite size of 31.845 nm, cubic phase formation, and strain of ~1.6 X10-2. FE-SEM/SEM/EDX shows the well-faceted homogeneous surface structure at 6000 rpm having the average particle size of 130.05 nm. FT/IR confirms the presence of CdO:Al in the film with the peak position shifting to higher wavenumbers.

12. Samirah Salifu
Sophomore
Chemical Engineering (Poster Presentation)
Vanderbilt University
Dr. Ethan Lippmann

Controlling Peptide Binding Chemistry and Density within Gelatin Hydrogels

In an effort to test hydrogels without excessive animal testing, we are developing a microfluidic device to serve as a screening tool. These microfluidic devices will be used to grow vascular tissue in several hydrogel conditions. Each hydrogel has a gelatin base with different vascular promoting peptides chemically bound. My project has focused on synthesizing and quantifying these hydrogels across three different peptide factors: sequence, binding chemistry, and concentration. The three peptide activities being tested include QK (a VEGF mimetic peptide), N-cadherin (cell adhesion peptide), and HepPep (a heparin binding peptide). Two peptide-binding chemistries are being assessed in this experiment, click-chemistry via a maleimide-thiol reaction and EDC/NHS coupling. Finally, each peptide was bound at three concentrations, resulting in a low, medium, and high format of each. In total 18 distinct hydrogel formulations are being created for our screen. Additionally, to accurately quantify the amount of peptide in each dose of hydrogel, all variants will be duplicated with a fluorescently tagged peptide. Utilizing UV-Vis spectroscopy, the quantity of fluorescent peptide within each batch will be measured using Beer Lambert's law. By combining Nuclear Magnetic Resonance data with the fluorescent dataset, we can accurately quantify the peptide content within each hydrogel dose. Next steps include testing each hydrogel variation in the microfluidic devices to screen with vascular antibodies to determine the best hydrogel formulations. Subsequently, the best formats will progress to mouse fat pad injections for further evaluation and validation.