CNAS Undergraduate Research Day
Tuesday, April 24, 2015
Abstract Deadline: Friday, April 10, 2015

Abstract Instructions:

To present your research at CNAS Research Undergraduate Day, please submit the following electronically to Gale Lininger (GaleLininger@missouristate.edu)

No later than 5:00 pm on April 10, 2015.

- ✓ Name, phone #, email address
- ✓ Abstract (WORD document - see format on next page) – Times New Roman 12 pt font (no more than 200 words)
- ✓ Please see the subsequent page of example abstracts and follow the formatting exactly.

Poster Instructions:

- ✓ **All displays must be set up by 2:00 PM on April 24. They will remain posted from 2 pm – 4 pm. Presenters are expected to be on site from 2:15-3:45.**
- ✓ *Wooden display boards will be provided; therefore you must limit the size of your poster to **4 feet tall x 6 feet wide**.*
- ✓ *Presenters will bring their own presentation materials which will be secured to the display board with push pins. Only materials are attachable to the display board are allowed.*
- ✓ *Push pins will be provided to secure poster materials*

Speaker and the awards ceremony will begin at 4:00 pm in PSU 313.

FORMATION OF RECTIFYING CONTACTS ON ZNO THIN FILMS USING PULSED LASER DEPOSITION. Ayan Bhattacharya, Dr.Pawan Kahol, and Dr.Ram Gupta, Materials Science. Faculty Advisor: Dr. Kartik Ghosh.

In recent days Zinc oxide (ZnO) has drawn innumerable interest for its versatile characteristics and application to different domains. With a bandgap of 3.3eV, ZnO promises to be utilized as low wavelength detectors and photovoltaic devices. A new direction of fabrication of photovoltaics is usage of rectifying behavior of a metal-semiconductor junction. Based upon the growth parameters, metal-ZnO contact can be ohmic or rectifying in nature. The primary step lies in formation of stable rectifying contact with novel metals such as Gold (Au), Silver (Ag), Platinum (Pt) and ZnO, for any optoelectronic device. Here we make some systematic study of optimization of the growth parameters for metal (Au, Ag) and ZnO contact. In general inherent oxygen vacancies act as source of conducting nature of ZnO. A controlled lowering of carrier concentration from this defect band only makes it possible to observe rectifying nature. ZnO films are grown at oxygen pressure ~10-3 mbar at 400oC by Pulsed Laser Deposition, films are annealed next. Growth at oxygen pressure and post-annealing treatment reduces the carrier concentration of ZnO from 10-20/cm3 to 10-15/cm3. Transparency of the films grown in ambient oxygen pressure reaches nearly 98%. Detailed observations of I-V characteristics, transmission spectra and XRD data will be presented.

INVESTIGATING THE ROLE OF DNA CONFORMATION IN THE REPAIR BY 8-OXOGUANINE DNA GLYCOSYLASE. Mallory E. Clark, Chemistry. Faculty Advisor: Dr. Gary Meints.

Through normal aerobic metabolism, reactive oxygen species (ROS) are formed as byproducts and react with proper DNA. The interaction with ROS results in the oxidation of guanine producing 8-oxoguanine, and has been linked to aging, Alzheimer's Disease, and various forms of cancer. The repair process, Base Excision Repair (BER), protects the integrity of the DNA and prevents mutations on a molecular level. BER employs enzymes to identify and bind with the damaged DNA base site, remove it from its helical position, and cut it from the DNA strand before inserting the proper base. The latter two steps are well understood, with the process of the identification of the damaged DNA base in question. The difference between a proper DNA base compared to a damaged DNA base may be structurally minimal, but the process has proved to be efficient and precise. In the case of 8-oxoguanine, which structurally differs from guanine by an oxygen atom, the 8-oxoguanine DNA glycosylase (hOGG1) identifies the damaged base in the vast majority of guanine bases. We propose that a conformational change occurs to the DNA backbone that contains the 8-oxoguanine to aid in its identification. Through the means of phosphorus NMR, we are able to study the phosphorus atoms present in the DNA backbone in order to determine conformational changes.

ANALYZING VARIATION OF METAMORPHOSIS SUCCESS OF FRESHWATER MUSSEL GLOCHIDIA LARVAE. Andrea K. Crownhart, Michael J. Pillow, and Jingjing Miao, Biology. Faculty Advisor: Dr. Chris Barnhart.

Larval parasitism is a critical stage in the freshwater mussel lifecycle. Factors that limit metamorphosis on the fish host are not well understood. We examined metamorphosis success (%M) among individual fish for several different mussel-host species pairs. Groups of fish were infected and glochidia and metamorphosed juveniles were recovered quantitatively. Mean %M of 7 lampsiline species was 75-95%, including 3 *Lampsilis* species on largemouth bass, *Ligumia recta* on walleye, and 2 *Potamilus* species and *Ellipsaria lineolata* on freshwater drum. However, among individual fish, %M of these species varied from near zero to 100%, with mean CV=14%. We infected drum with *E. lineolata* and *P. alatus* simultaneously to test whether individual differences in %M among fish were species-specific. Metamorphosis success of both species was highly correlated among individual hosts (R^2=0.86). This observation argues that the differences among individual fish are not mussel species-specific and therefore probably not related to the adaptive immune system. Variation in metamorphosis success among host fish was unusually high in two mussel species: *Leptodea leptodon* on freshwater drum and *Quadrula fragosa* on blue catfish. The glochidia of these two species are unusually small (<80 μm) and grow during the period of encapsulation on the host.