

Undergraduate Research Symposium May 18, 2018 Mary Gates Hall

Online Proceedings

POSTER SESSION 2

Commons West, Easel 10

1:00 PM to 2:30 PM

Synthesis of Graphene Oxide Quantum Dots from Biochar

Sydney Michelle Fry, Senior, Bioresource Science and Engr: Business

Mentor: Anthony Dichiara, Bioresource Science & Engineering

Mentor: Sheila Goodman

Quantum Dots (nanoparticles with semiconductor properties) are currently produced from potentially toxic materials, and are expensive to prepare. Developing a less toxic, more renewable quantum dot has the potential for utilization in biosensors and bioimaging without the high cost or environmental pollution associated with current metal-based quantum dots. Methods for developing graphene quantum dots are being investigated by utilizing a sustainable carbon source. Specifically, the use of hydrogen peroxide as an oxidant in a hydrothermal reaction is being optimized in terms of reaction time, temperature, carbon:oxidant ratio, and oxidant concentration. Carbon sourced from research being conducted on campus allows for reduced cost and waste treatment while providing an alternative to metal-based quantum dots. Further work on the subject will include incorporating the quantum dots into handsheets (paper samples) to test fluorescence, which ultimately will be used as optical and photoelectric sensing materials due to their high stability and distinct long-term fluorescent properties. Additionally, there is potential to explore other oxidants and carbon sources that have minimal environmental impact.

POSTER SESSION 2

Commons West, Easel 9

1:00 PM to 2:30 PM

Synthesis of Reduced Graphene Oxide Aerogels for Detoxification of Biorefinery Effluents

Amy Elizabeth Clingman, Junior, Bioresource Science and Engineering

Mentor: Anthony Dichiara, Bioresource Science & Engineering

Mentor: Sheila Goodman

The removal of contaminants from aqueous media is a challenge faced in many engineering systems. In particular, fermentation processes during biofuel production is hampered by a variety of toxic compounds present in hemicellulosic hydrolysates. Adsorption is an efficient and economic method of reduction in the amounts of phenolic compounds, acetic acid, aromatic compounds, furfural and hydroxymethylfurfural normally found in hemicellulosic hydrolysates. Activated carbon is currently the most widely used adsorbent. However, its poor reusability and its limited capacity to uptake larger molecules due to size exclusion effects necessitate the investigation into alternative materials. Carbon nanomaterials exhibit high specific surface area and open pore structure, making them very compelling for hydrolysate detoxification. To overcome the tendency of carbon nanomaterials to aggregate, which greatly reduces the number of sites available for adsorption, we developed mesoporous, nitrogen-doped, reduced graphene oxide aerogels with an open three-dimensional network. Graphene oxide was first prepared from renewable carbon sources and reduced by hydrothermal treatment to form hydrogels, which were then freeze-dried in tert-butanol to form aerogel sorbents. By adjusting the different synthesis parameters (i.e. temperature, pH, chemical dosages...), we were able to finely control the pore structure and chemical composition of the nitrogen-doped graphene aerogels, as measured by nitrogen physisorption and elemental analysis. Results revealed superior adsorption properties than activated carbon for the hydrolysate detoxification, which improved fermentation yields.

POSTER SESSION 2

Commons West, Easel 43

1:00 PM to 2:30 PM

The Voice of God: Factors that Influence the Use of Religious Rhetoric on Congressional Webpages

Jon Michael Schaeffer, Senior, Law, Societies, & Justice, Political Science

UW Honors Program

Mentor: John Wilkerson, Political Science

Mentor: Anthony Gill, Political Science

Religious rhetoric has been a common tool in politics for the majority of American history, from Thomas Jefferson being “unfit to lead a Christian Nation” to Ronald Reagan’s “City Upon a Hill”. Although the Constitution declares the govern-

ment to be secular, members of Congress, to varying degrees, regularly invoke religious imagery and rhetoric in the public communications. This study seeks to understand why. I examine congressional religious rhetoric using a unique data source of congressional webpages from the massive .GOV collection of the Internet Archive Project. I hypothesize that members' personal beliefs and electoral strategies help to explain differences in website content. I measure the personal religiosity of members using a carefully constructed scale of involvement in their religious communities. I measure district religiosity using information about district-level church attendance and prayer frequency from the Cooperative Congressional Election Survey. Finally, I draw from established religion lexicons to measure religious emphasis in congressional website content. I find positive, statistically significant support for both hypotheses. This work sheds light on politicians in particular members of congress are actively seeking to brand themselves through the internet for political purposes.