SDG AT AIUB

American International University-Bangladesh (AIUB) is committed to achieve the United Nations 17 Sustainable Development Goals through different initiatives. These reports outline year-long different activities, such as research & publications, enhancing social inclusion, encouraging environmental sustainability, partnerships, good governance, and diversity among students and employees as well as its associated mapping to different SDGs.

American International University-Bangladesh (AIUB)

SDG Activity Report – 2022

SDG 6:

Clean Water and Sanitation

AIUB SDG Activity Report 2022

SDG 6: Clean Water and Sanitation

American International University-Bangladesh (AIUB) is taking robust initiatives to contribute to Sustainable Development Goal 6: Clean Water and Sanitation, both through university activities and faculty research. AIUB's commitment to promoting clean water and sanitation is evident in its diverse range of activities that not only raise awareness but also provide practical training.

The university recognizes the importance of ensuring hygiene in various settings, and the "Training on Food Hygiene, Cleaning, and Services" is a testament to this commitment. By imparting knowledge and skills related to food hygiene, AIUB is not only enhancing the capabilities of its community but also contributing to the broader goal of clean water and sanitation.

In celebration of "World Environment Day 2022," AIUB organized events that underscored the significance of environmental conservation and sustainable practices. Such initiatives serve to instill a sense of responsibility among the university community and beyond, fostering a collective understanding of the crucial role clean water and sanitation play in preserving the environment.

AIUB's faculty is actively engaged in research that aligns with the objectives of SDG 6. Research papers such as "Sensitivity Control of Hydroquinone and Catechol at Poly (Brilliant Cresyl Blue)-Modified GCE by Varying Activation Conditions of the GCE" and "Cobalt Oxide Nanorod-Modified GCE as Sensitive Electrodes for Simultaneous Detection of Hydroquinone and Catechol" showcase the university's commitment to advancing scientific knowledge for the betterment of water quality.

Moreover, the research on "Natural Sunlight Driven Photocatalytic Removal of Toxic Textile Dyes in Water Using B-Doped ZnO/TiO2 Nanocomposites" and "Ag-modified g-C3N4 with enhanced activity for the photocatalytic reduction of hexavalent chromium in the presence of EDTA under ultraviolet irradiation" demonstrates AIUB's dedication to exploring innovative solutions for water treatment. These studies not only contribute to the academic landscape but also have practical implications for addressing water pollution challenges.

In response to contemporary challenges, such as the COVID-19 pandemic, AIUB's faculty is actively contributing to the discourse on the intersection of health, sustainable development, and clean water. The research on "Digital Design and Implementation of an IoT-Based Smart Bio-Toilet with Hygiene Maintaining System" exemplifies the university's forward-thinking approach to integrating technology for improved sanitation practices.

Furthermore, the faculty's broader engagement in "Research and Development on Embedded System Design to Attain Sustainable Development Goals" showcases AIUB's commitment to harnessing technology for sustainable outcomes, including advancements in clean water and sanitation.

In conclusion, AIUB's multifaceted approach, encompassing both university activities and faculty research, reflects a positive and proactive stance toward addressing the challenges outlined in SDG 6. By combining awareness-building initiatives with cutting-edge research, AIUB is making valuable contributions to the global effort to ensure clean water and sanitation for all. The university's dedication to innovation and education underscores its pivotal role in shaping a sustainable future.

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University Activities

Training on Food Hygiene, Cleaning and Services

On 2nd September 2022 the Training & Development section of the Office of Human Resources, AIUB (HRD) arranged a day long training session on Food Hygiene, Cleaning, and Services at the AIUB Training and Research Centre, Sreepur for its class 4 service staff - office peons, supervisors, kitchen staff, chefs, housekeepers, and also for AIUB canteen's (Café Shanzaib) staff.

The main facilitator Mr. Mohd. Oliullah, Director, Food and Beverage of the Pan Pacific Sonargaon Hotel, who has over 30 years of practical experience on this sector conducted the first part of the session. He explained how to deliver a service by finding out a suitable solution anticipating the situation, then exceeding the expectations by correctly handling the moments.

After morning session Mr. Fahad Tanveer Aleef, Consultant, Hotel & Resorts, CORPORATECOACH, Dhaka showed in-depth food and beverage skill know-how and hands-on techniques for consistently delivering quality service in every type of food hygiene and service operations. Around 30 participants took part in this training session.

World Environment Day 2022 celebrated

The AIUB Social Welfare Club - Shomoy of the American International University-Bangladesh (AIUB), in collaboration with the Department of Chemistry, organized a series of events to celebrate the World Environment Day 2022. On the 5th of June 2022, the event was inaugurated by Ms. Nadia Anwar, the Founder Member of the AIUB Board of Trustees, where Dr. Abdur Rahman, there Associate Dean of the Faculty of Engineering, Dr. S. Mosaddeq Ahmed, the Head, for the Department of Chemistry, Dr. Mohammad Mahbub Rabbani, the Deputy Director of the Dr. Anwarul Abedin Institute of Innovation, Mr. Manzur H. Khan, the Director of Student Affairs, Mr. Ziarat H. Khan, Deputy Director for Student Services & Welfare, and several other faculty members, administrative officials, and students were also present. Ms. Anwar planted a tree on the campus premises, commemorating the occasion, after which the Dr. Rahman, Dr. Ahmed, and Dr. Rabbani, together presented saplings to the members of the AIUB Shomoy Club as a token to initiate their tree plantation campaign and encourage other students to join the cause.

A rally comprising of members of the AIUB Shomoy Club, general students, faculty members, and administrative officials marched across the campus, with various placards to spread awareness on climate change and inspire us to take necessary steps to save our environment. Later, a constructive seminar on the World Environment Day – Session to Save the Earth was held in the Media Studio on campus, with Mr. Saif Islam, the Program Officer at the International Labor Organization (ILO), as the guest speaker, who shared his experience and insights on climate change with the students who attended the session. Dr. Ahmed and Dr. Rabbani gave the welcome address and the vote of thanks, concluding the session by presenting a token of appreciation to the esteemed guest speaker. The series of events motivated students and staff alike to undertake actions to protect and preserve our environment and work towards making the world a better place today to ensure a brighter future tomorrow..

Faculty Research and Publication

Sensitivity Control of Hydroquinone and Catechol at Poly (Brilliant Cresyl Blue)-Modified GCE by Varying Activation Conditions of the GCE: An Experimental and Computational Study

Author: DR. MOHAMMAD MAHBUB RABBANI et al.

Brief Description:

The poly(brilliant cresyl blue) (PBCB)-modified activated glassy carbon electrode (AGCE) shows the catalytic activity toward the oxidation of hydroquinone (HQ) and catechol (CT). The modified electrode can also separate the oxidation peaks of HQ and CT in their mixture, which is not possible with bare GCE. These properties of the modified electrode can be utilized to fabricate an electrochemical sensor for sensitive and simultaneous detection of HQ and CT. In this study, an attempt is made to control the sensitivity of the modified electrodes. This can be accomplished by simply changing the activation condition of the GCE during electropolymerization. GCE can be activated via one-step (applying only oxidation potential) and two-step (applying both oxidation and reduction potential) processes. When we change the activation condition from one step to twosteps, a clear enhancement in peak currents of HQ and CT is observed. This helps us to fabricate a highly sensitive electrochemical sensor for the simultaneous detection of HQ and CT. The molecular dynamics (MD) simulation is carried out to explain the experimental data. The MD simulations provide the insight adsorption phenomena to clarify the reasons for higher signals of CT over HQ due to having meta-position –OH group in its structure.

Source: https://www.mdpi.com/2305-7084/6/2/27

Cobalt Oxide Nanorod-Modified GCE as Sensitive Electrodes for Simultaneous Detection of Hydroquinone and Catechol

Author: DR. MOHAMMAD MAHBUB RABBANI et al.

Brief Description:

An electrochemical sensor based on a cobalt oxide nanorod (Co3O4NR) modified glassy carbon electrode (GCE) (Co3O4NR-GCE) was prepared for simultaneous and selective determination of hydroquinone (HQ) and catechol (CT). Surface morphology and crystallinity of Co3O4NR were investigated employing field emission scanning electron microscopy (FESEM) and X-ray diffraction (XRD) analysis. The structure (16 nm) of the Co3O4 nanorod was observed in the FESEM image. A sharp peak pattern in the XRD survey revealed the following crystal planes in Co3O4NR material: (111), (220), (311), (222), (400), (422), (511), and (440). Electrochemical characterization of modified Co3O4NR-GCE was carried out performing cyclic voltammetry (CV) and electrochemical impedance spectroscopy (EIS). Selective and simultaneous detection of HQ

and CT was carried out by performing CV and differential pulse voltammetry (DPV) analysis. In both studies, modified Co3O4NR-GCE showed well defined oxidation and reduction peaks for HQ and CT with enhanced peak current, and the oxidation peaks for HQ and CT were observed at 0.152 V and 0.254 V, respectively, in the CV analysis. Scan rate and pH variation analysis were performed to evaluate different kinetic parameters, including charge transfer coefficient (α = 0.56 for HQ and 0.66 for CT), heterogeneous charge transfer rate constant (ks = 56 for HQ and 72 for CT), and the number of electrons involved in HQ and CT oxidation. Quantitative analysis of HQ and CT was studied by observing the current response of DPV analysis with respect to concentration variation. Here, the detection limit was calculated as 0.2 µM for HQ with a linear concentration range of 5–200 µM, and 0.4 µM for CT with a linear concentration range of 5–150 µM. The practical applicability of the proposed sensor was investigated using sample solutions prepared in tap water. The reported sensor showed impressive selectivity towards HQ and CT in the presence of common interferents.

Source: https://www.mdpi.com/2227-9717/10/2/390

Natural Sunlight Driven Photocatalytic Removal of Toxic Textile Dyes in Water Using B-Doped ZnO/TiO2 Nanocomposites

Author: SHAHRIAR ATIK FAHIM et al.

Brief Description:

A novel B-doped ZnO/TiO2 (B–ZnO/TiO2) nanocomposite photocatalyst was prepared using a mechanochemical–calcination method. For the characterization of the synthesized B–ZnO/TiO2 photocatalyst, XRD, FESEM-EDS, FTIR, UV-Vis DRS, BET, PL, and XPS techniques were used. The bandgap energy of B–ZnO/TiO2 was reduced, resulting in enhanced visible-light absorption. Significant PL quenching confirmed the reduction in the electron–hole recombination rate. Furthermore, reduced crystallite size and a larger surface area were obtained. Hence, the B–ZnO/TiO2 photocatalyst exhibited better photocatalytic activity than commercial TiO2, ZnO, B–ZnO, and ZnO/TiO2 in the removal of methylene blue (MB) dye under natural sunlight irradiation. The effects of various parameters, such as initial concentration, photocatalyst amount, solution pH, and irradiation time, were studied. Under optimal conditions (MB concentration of 15 mg/L, pH 11, B–ZnO/TiO2 amount of 30 mg, and 15 min of operation), a maximum MB removal efficiency of ~95% was obtained. A plausible photocatalytic degradation mechanism of MB with B–ZnO/TiO2 was estimated from the scavenger test, and it was observed that the •O−2 and •OH radicals were potential active species for the MB degradation. Cyclic experiments indicated the high stability and reusability of B–ZnO/TiO2, which confirmed that it can be an economical and environmentally friendly photocatalyst.

Source: https://www.mdpi.com/2073-4344/12/3/308

Ag-modified g-C3N4 with enhanced activity for the photocatalytic reduction of hexavalent chromium in the presence of EDTA under ultraviolet irradiation

Author: DR. JAHIDA BINTE ISLAM et al.

Brief Description:

The photocatalytic reduction of Cr6+ to Cr3+ in an aqueous solution, using 3 wt% Ag/g-C3N4 in the presence of ethylenediaminetetraacetic acid (EDTA), has been investigated here. The photocatalytic reduction of Cr6+ with pure g-C3N4 was very low. The addition of Ag and EDTA can significantly improve the photocatalytic reduction of Cr6+ using g-C3N4. In the presence of EDTA, the efficiency with Ag/g-C3N4 was better than those with Au/g-C3N4 and Cu/g-C3N4. With EDTA, the reduction rate constant increased from 0.0005 for pure g-C3N4 to 0.12 min−1 for 3 wt% Ag/g-C3N4. By increasing the concentration of EDTA from 0 to 500 mg L−1, the reduction efficiency of Cr6+ increased extremely, and the rate constant raised from 0.008 to 0.12 min−1. The optimal EDTA concentration was 500 mg L−1 for the photocatalyst Ag/g-C3N4. The Ag-EDTA complex may be reduced to metallic silver by the conduction band electrons of g-C3N4. The electron–hole recombination was significantly suppressed by the electron trapping of Ag. EDTA may act in by the formation of Cr3+-complex and the separation of Cr3+ from the g-C3N4 surface and by the valence band hole scavenger of g-C3N4. X-ray diffraction (XRD), Fourier transform infrared spectroscopy (FTIR), scanning electron microscope (SEM), transmission electron microscope (TEM), X-ray photoelectron spectroscopy (XPS), UV–Vis diffuse reflectance spectroscopy (DRS) and photoluminescence spectra (PL) were used to characterize g-C3N4 and Ag/g-C3N4 nanoparticles. A possible mechanism for photocatalytic Cr6+ reduction has also been demonstrated.

Source: https://www.tandfonline.com/doi/full/10.1080/09593330.2022.2068379

COVID-19 and Sustainable Development Goals: Bangladesh Perspective

Author: MD. MORTUZA AHMMED et al.

Brief Description:

The objective of this study is to evaluate the state of the Sustainable Development Goals (SDGs) in Bangladesh before the arrival of COVID-19 along with its apparent impact on the accomplishment of SDGs in the future. Data from several national and international sources have been utilised to serve the analytical purpose of the study. Obliteration of the commendable accomplishments regarding some of the SDGs so far and resetting of the goals in terms of precedence are going to be the main consequences of COVID-19 concerning SDGs in Bangladesh which would impede attaining SDGs. However, constrictions in the production of industries along with a massive drop in fossil fuel usage through vehicles would give some respite to nature leading to notable progress regarding SDG 13, SDG 14 and SDG 15. But it would never recompense significantly for the overall effect resulting from COVID-19.

Source: https://www.inderscience.com/info/inarticle.php?artid=125098

Digital Design and Implementation of an IoT-Based Smart Bio-Toilet with Hygiene Maintaining System

Author: DR. MUHIBUL HAQUE BHUYAN et al.

Brief Description:

Bangladesh is a country with a rich linguistic and cultural diversity population. Many people in our country still do not have access to a healthy sanitation system. To maintain health and hygiene, developing a smart latrine system is a great challenge. This has motivated us to provide a proper solution for our people by designing an eco-friendly and hygienic sanitation system to save water, power, and other resources. As such, we aimed to design and implement an IoT-based smart bio-toilet with maintaining health and hygiene. We intend to develop an electrically operated, environmentally friendly, biodegradable restroom with automatic user operation and remote monitoring system in key places of the country, especially in rural areas. Our system will have a PV system to provide electrical energy to the whole system, an wireless data communication system with cloud data storage, a water management system for the reuse of water, and an automated waste management system that will provide organic fertilizers for agriculture. After the integration of all the sub-systems, the entire system will be tested and put into practice physically. It is necessary to mobilize and engage money, resources, people, equipment, and information to implement. The installation of smart bio-toilets in various locations throughout the districts and sub-districts has been suggested, especially in rural areas, and thus prevent open-air excretion, pollution of water bodies, and promote safety and dignity for women and other community users such as slam, school, and college. Therefore, for this research work, we need to generate funds, create public awareness, involve people, assign tasks, and maintain communication among various stakeholders for proper coordination. We are hopeful that through this research and development work, we will be able to move one step forward toward the realization of our Golden Digital Bangladesh.

Source: https://www.4iref.org/

Research and Development on Embedded System Design to Attain Sustainable Development Goals

Author: DR. MUHIBUL HAQUE BHUYAN et al.

Brief Description:

In 2000, world leaders adopted the Millennium Development Goals (MDGs) to eliminate certain critical problems from this earth. Then in 2015, The United Nations adopted the well-known 17 Agenda of the Sustainable Development Goals (SDG) to realize a sustainable world by 2030. It was recognized that poverty and other problematic issues in this world must be resolved jointly by initiating a group of action plans to obtain sustainable developments through signs of progress in the areas of poverty, health, energy, education, gender inequality, economic growth,

environment and climate changes, social issues, collection, and preservation of natural resources, etc. The 17 SDGs comprise 169 sub-targets, all of which must be achieved within 2030 through an integrated approach and cooperation. To achieve these goals, engineering research, innovations, development, and commercialization of the designed products can assist us in the respective areas. In this talk, I shall emphasize the recent research and innovations in embedded system design to achieve the SDGs. These ventures will help both societal and economic repayments in the world for sustainable growth. In this talk, I shall also focus on the seven areas of the SDGs where embedded system design has an important role to execute. These are mainly related to good health and well-being, quality education, clean water and sanitation, affordable and clean energy, sustainable cities and communities, life below water, and life on land. In fine, we may conclude that the advancement of embedded system design surely helps electrical and electronic engineers to design and develop complex engineering problems' solutions to achieve the mentioned specific SDGs, and hence to realize a sustainable world for humanity.

Source: https://dspace.aiub.edu/jspui/handle/123456789/845

Author: FERDOUSI BEGUM et al.

Brief Description:

Water constitutes a substantial factor in the enjoyment of right to life. South Asian States acknowledge right to water in the domestic level. Question arises whether the same right will be applicable while using water from the shared water resources of South Asia as ensuring right to water is essential for the livelihood of citizens living on the embankment of those transboundary rivers. One of the major challenges associated with the management of shared water resources is to develop suitable mechanisms while adapting the impact of climate change as climate change has a major impact on water scarcity. There are different theories and principles of international water law related to transboundary water resources management. One of the most fundamental principles of that is the idea of equitable and reasonable utilization of water; it has been included in the Convention on the Law of the Non-navigational Uses of International Watercourses, 1997. It is accepted as a declared customary international law in case of using water from shared water resources although very few States of South Asia ratifies this Convention. South Asian States can establish bilateral mechanisms on the basis of this principle wherein the basis of sharing of water will be upon the accessibility and availability of water in the face of climate change as well as which can meet the overall need of the overgrowing population. In applying this principle the standard is not what is an equitable use for the activities of a State from a shared watercourse rather what is equitable in relation to other States using the same. This article will examine whether the transboundary water agreements of South Asia take into account the exercise of right to water from human rights perspective while using water from shared water resources and while adapting water crisis due to climate change. It will also examine the extra-territorial application of human rights in international law while using water from shared water resources and how it is working in the domestic level of South Asian region.