5th INTERNATIONAL NANOTECHNOLOGY WORKSHOP

NW-5, 2022

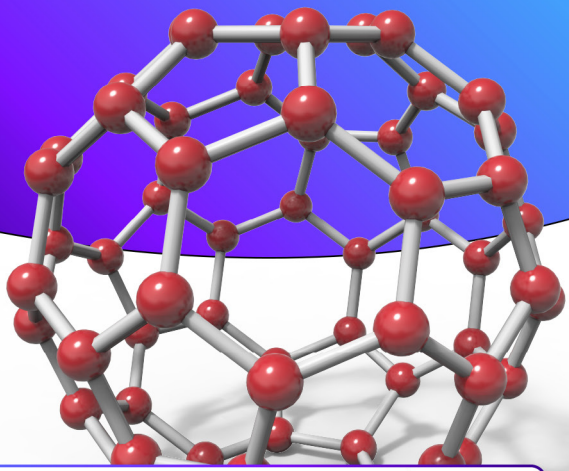
Theme: Novel Applications of Nanotechnology in Multidiscipline

15 JANUARY 2022

Saturday at 10.00 AM

THIS WORKSHOP IS ORGANIZED BY:
PHYSICS EDUCATION DEPARTMENT,
FACULTY OF EDUCATION,
TISHK INTERNATIONAL UNIVERSITY

Tishk International University



ABSTRACT BOOK

Participating Universities

TIU ERBIL 2008 · Hawler Medical University · Soran University · The University of Nottingham · University of Sulaimani · The American University of Iraq Sulaimani

5TH INTERNATIONAL NANOTECHNOLOGY WORKSHOP
(Face to face and Online)

5th International Nanotechnology Workshop Program NW-5
(Face to face and Online)
"Novel Applications in Nanotechnology in Multidiscipline"

Saturday, January 15th, 2022

Organized by Physics Education Department, Education Faculty, Tishk International University Erbil-Iraq

Please note: *This program will be performed in hybrid format both Face-to-Face and Online
*Be informed that the Zoom link was scheduled according to **Baghdad Time Zone**

Zoom link: https://zoom.us/j/96340143708?pwd=ek1uYUR2ZFhteURNaVJBZ0FiQVYrdz09

9:30 - 10:00 AM	• Registration
10:00 - 10:20 AM	• Opening Ceremony and Welcoming Speech • Promotional Video of TIU
1st SESSION	
Session Chair	**Dr. Muhammad Hisham, University,** *Tishk International University*
10:20 - 10:50 AM	1st Keynote speech: **Asst. Prof. Dr. Ahmed Salih**, *University of Sulaimani, College of Engineering and American University of Iraq, Sulaimani - Iraq* **Effects of the Nano-Silica Sand on the Sensing and Rheological Properties of the Hydraulic Fracturing Fluid**
10:50 - 11:20 AM	2nd Keynote speech: **Asst. Prof. Dr. Azeez A. Barzinjy,** *Salahaddin University and Tishk International University, Erbil - Iraq* **Green Synthesis of Nanoparticles: Novel Applications in Harvesting Sunlight for Solar Thermal Generation**
11:20 - 11:40 AM	**Tea Break**
2nd SESSION	
Session Chair	**Mr. Sivar Aziz** *Tishk International University*
11:40 - 12:00 AM	3rd Keynote speech: **Asst. Prof. Dr. Samir Mustafa Hamad,** *Soran Research Center, Soran University, Erbil-Iraq* **Effect of Growth Time on Morphology and Structure of ZnO Nanomaterials Using Biosynthesis Method**
12:00 - 12:30 AM	4th Keynote speech: **Prof. Dr. Mohamed Henini,** *School of Physics and Astronomy, University of Nottingham-UK* **Development of Advanced Semiconductor Materials and Devices for Next Generation Photovoltaics: Opportunities and Challenges** **-ONLINE-**
12:30 - 13:00 AM	5th Keynote speech: **Prof. Dr. Kamal Kolo,** *Scientific Research Center - Soran University, Erbil-Iraq* **Enhanced Oil Recovery (EOR) Through Modification of Petrophysical Parameters in Reservoir Rocks using Nanotechnology - Lab versus Field Applications**
13.00 - 13.40 AM	**Lunch Time**
13:40 - 14:15 AM	**POSTER PRESENTATION**
14:15 - 15:00 AM	**Panel Discussion: How to Direct Nanotechnology Research Path in Serving Community** **Panel Moderator: Dr. Wala Gazey Dizayee** *Salahaddin University* Speakers: Dr. Amir Abdulrahman Ahmed, *Adviser of of Scientific Research in MHE.,* Prof. Dr. Kamal Kolo, Asst. Prof. Dr. Samir Mustafa, Asst. Prof.Dr. Ahmed Salih
15:00 - 15:20 AM	**Closing and Certificate Delivery Ceremony**

Effects of the Nano-Silica Sand on the Sensing and Rheological Properties of the Hydraulic Fracturing Fluid

Assistant professor, Dr. Ahmed Salih Mohammed

University	Civil Engineering Department, College of Engineering, University of Sulaimani, Kurdistan, Iraq, Sulaimani, American University of Iraq, Sulaimani
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ABSTRACT

Hydraulic fracturing operations involve pumping of specially designed fluids into a formation at a specified pressure and rate to generate fractures in the formation to enhance the recovery of gas and oil. These fluids typically consist of water, sand and chemical additives. Present technology is such that over 99% of the hydraulic fluid composition is sand and water. The added chemicals are multifunctional to increase the viscosity, reduce friction, controlling bacteria and decreasing corrosion. Success of a hydraulic fracturing operation is very much depends on the performance of the sand in the hydraulic fracturing fluids. This experimental study was focused on determining and quantification the effect of nano-silica sand on the sensing properties (electrical resistivity), rheological properties and fluid loss of hydraulically fracturing fluid using tap and salt water at different temperatures. Also the study was focused on the two most popular formations available in oil and gas well which are sandstone and shale and the rock samples were characterized and correlated based on the mechanical and electrical properties (Ultrasonic pulse velocity). Added chemicals (less than 1%) included Guar gum, salt and surfactant. The nano-silica sand in the fracturing fluid was varied up to 1%. A series of experimental studies were undertaken to investigate effects of nano-silica sand on the viscosity, fluid loss control, permeability and fracturing behavior under high pressure and high temperature (HPHT). Shear stress-strain rate relationships have been developed for the modified fluid and the parameters were related to the concentration of nano-silica sand. Also the fluid loss time relationships have been developed for the modified fracturing fluid.

Green Synthesis of Nanoparticles: Novel Applications in Harvesting Sunlight for Solar Thermal Generation

Azeez Abdullah Barzinjy

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ABSTRACT

Nanotechnology is an emerging field of science. The base of nanotechnology is nanoparticles. The nanoparticles are classified into different classes such as inorganic nanoparticles, organic nanoparticles, ceramic nanoparticles and carbon base nanoparticles. The inorganic nanoparticles are further classified into metal nanoparticles and metal oxide nanoparticles. Similarly, carbon base nanoparticles classified into Fullerene, Carbon nanotubes, Graphene, Carbon nanofiber and carbon black. Nanoparticles are also classified on the basis of dimension such as zero-dimension, one-dimension, two-dimension and three-dimension nanoparticles. The nanoparticles are synthesized by using two approaches like top-down approach and bottom-up approach. Since the main methods for producing nanoparticles are chemical and physical methods which are often expensive and potentially harmful to both the environment and the user. So, we did our best in our researches to synthesize metallic nanoparticles using plant extracts and stay away from expensive and toxic chemicals at the same time. Therefore, it is with great pride that our research group is considered a pioneer in the region, and many high quality research articles have been published by our group highlighting the necessary needs of the community [1-22] regarding green synthesis nanomaterials. After synthesizing different types of nanoparticles, using easy, one-pot, inexpensive and green process, from locally grown plant extracts, different characterization techniques have been used to investigate structure, size, morphology, thermal behavior, surface area, surface charge, chemical composition and optical properties of the nanoparticles. Here, the biosynthesized Ag NPs were utilized in harvesting sunlight for solar thermal generation. Surface plasmon resonance (SPR) for the green synthesized Ag NPs with the dark color were adjusted at nearly 450 nm. Once the Ag NPs are excited at the SPR, a large amount of heat is released, which causes a change in the local refractive index surrounding the Ag NPs. The released heat from the Ag NPs under the solar irradiation at the precise wavelength of plasmon resonance significantly increased the temperature of the aqueous medium. This investigation is rare and unique, and it shows that utilizing a small amount of the biosynthesized Ag NPs can increase the temperature of the aqueous medium remarkably.

Effect of Growth Time on Morphology and Structure of ZnO Nanomaterials Using Biosynthesis Method

Asst. Prof. Dr. Samir Mustafa Hamad

University	Scientific research Center- Soran University, Erbil-Iraq

ABSTRACT

One-dimensional zinc oxide nanorods (ZnO NRs) have been investigated by using green method at low growth temperature. The use of parsley extraction for biosynthesis of ZnO NRs is a novel idea in this work. The effect of different growth time on the morphology, crystal structure, elemental composition, and optical properties of biosynthesis ZnO nanostructure have been studied. The morphology and crystalline structure of green synthesized ZnO nanorods were characterized using field emission scanning electron microscopy (FE-SEM) and X-Ray diffraction (XRD). The UV-Vis and FTIR spectroscopies were also performed to study the optical properties of both parsley plant extraction and ZnO NRs. The evolution of prepared ZnO was utilized at different growth time, namely 30 mints, 1 hour, 2 hours, and 3 hours which producing different growth nanostructures. The XRD analysis demonstrated that, all the ZnO samples are high quality and there are no additional peaks from other impurities. It was revealed that from UV-Vis spectroscopy the prepared zinc hydroxide solution displayed absorption peaks at different wavelengths from 351 nm to 383 nm, and an obvious blue shift can be observed of the absorption edges as the growth time increased. In addition, the biosynthesized methodologies and corresponding growth mechanisms of ZnO nanostructures have been discussed.

Development of Advanced Semiconductor Materials and Devices For Next Generation Photovoltaics: Opportunities And Challenges

Prof. Dr. Mohamed Henini

The University of Nottingham

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ABSTRACT

Renewable energy production is a key component in the drive towards a safe, secure energy supply for future low-carbon economies. Using energy from the sun to generate electricity provides a sustainable source of free, abundant, safe, clean energy, without use of any fossil fuels and without waste or pollution.

Solar cells (photovoltaic cells) are made of semiconductor materials that convert energy from the sun directly into electrical energy. Sunlight consists of a spectrum of different wavelengths (colours) of light, each corresponding to a different energy level. Semiconductor materials can only convert sunlight of specific wavelengths and energy into electrical energy. Remaining energy from the sun is lost. Existing semiconductors cannot utilise the entire spectrum distribution of sunlight. The strategy to increase the efficiency of solar cells is to use semiconductors optimised for different wavelength ranges of the spectrum.

Existing 'three junction' solar cells, which utilise three different semiconductors, are capable of converting sunlight from three regions of the spectrum into electrical energy. The drawback is that state of the art solar cells currently only convert 33% of solar energy into electricity. There is a great interest worldwide into developing innovative semiconductor materials capable of converting sunlight from a fourth specific portion of the solar spectrum into electrical energy. Retrofitting this fourth generation material onto current solar cells should significantly improve solar cell efficiency to >60%.

Currently a wide range of semiconductors is explored for their potential use in photovoltaic applications. However, solar cells are already an important part of our lives. The simplest systems power many of the small calculators and wristwatches. The complicated systems provide electricity for pumping water, powering communications equipment, and even lighting our homes and running our appliances. With the growth of the satellite industry and the increase of power requirements, larger solar arrays are needed to produce the required power. The familiar wings of most modern satellites are made of solar arrays.

In this talk, I will give an overview of the principles of solar cells, the properties of semiconductors suitable for solar cells, and some selected recent achievements in III-V solar cells.

Enhanced Oil Recovery (EOR) Through Modification of Petrophysical Parameters in Reservoir Rocks using Nanotechnology Lab versus Field Applications

Prof. Dr. Kamal Kolo

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ABSTRACT

The conventional and standard petrophysical parameters measured in petroleum reservoirs such as porosity, permeability, wettability, reducible/irreducible water saturations and oil mobility together with the more definite parameters such as capillary pressures, Interfacial Tension (IFT) and reservoir pressures are all driving forces behind how much oil and gas will be produced from a specific reservoir, whether it is a carbonate or clastic reservoir. Enhanced Oil Recovery (EOR) comes into action where and when the reservoir driving forces are depleted enough not to produce more oil even though the reservoir is still highly saturated with oil. Nanotechnology specifically nanoparticles/nanocomposites offer quite promising results regarding increasing the production through the modification of certain petrophysical parameters such as the reduction of Interfacial Tension (IFT) and wettability towards the enhancement of movement/displacement efficiency of oils in oil-wet rocks. Here we will present the research results, methodologies and experience gained at the Scientific Research Center and Department of Petroleum Engineering of Soran University.

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- PHARMACY

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- INTERIOR DESIGN
- CIVIL
- COMPUTER
- PETROLEUM & MINING
- SURVEYING & GEOMATICS
- MECHATRONICS

4 FACULTY OF SCIENCE

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- MEDICAL ANALYSIS

5 FACULTY OF LAW

- LAW

6 FACULTY OF EDUCATION

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- EDUCATION COMPUTER
- PHYSICS
- BIOLOGY

7 FACULTY OF ADMINISTRATIVE SCIENCES AND ECONOMY

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- TOURISM
- INTERNATIONAL RELATIONS AND DIPLOMACY
- BANKING AND FINANCE
- ACCOUNTING

8 PREPARATORY SCHOOL

9 CONTINUING EDUCATION CENTER (IUCEC)

- LANGUAGE COURSE
- PROFESSIONAL COURSE