List of Workshops during Fall 2018 & Spring 2019

	Name of speaker	College/Department	Type of event	Title	Date	Time
1	Mr Sarkhel Sirwan Ms Alice Bosely Ravin Burhan	OSAR	Workshop	Five One Labs	9/5/18	11:00-12:45
2	Mr Rebeen Qadir Mr Suwar Talibani	ENG / PTE	Workshop	Oil Well Delivery Process	10/18/18	10:00-14:00
3	Mr Twana Abdulrazaq	QA	Workshop	Designing Syllabi (Dentistry and Pharmacy)	10/25/18	11:00-12:30
4	Dr Snoor Jalal Dr Osman Sharif Dr Goran Raouf	ENG / CMP	Workshop	Histological and the Role of Image Processing in Histopathological Research	11/22/18	10:30-12:00
5	Dr Shirzad B. Nazhat Prof Dr Dler Baban	ENG / PTE	Workshop	An Insight Into Characterization of Fractured Reservoir	12/6/18	9:45-12:15
6	Mr Ghareeb Salih	LNG / ENG	Workshop	Steps to Succeed in the IELTS	2/25/19	13:30-15:30

List of Seminars during Fall 2018 & Spring 2019

	Name of speaker	College/Department	Type of event	Title	Date	Time
1	Dr Zanyar Faiq	LNG / ENG	Seminar	Western Culture: Logo-centrism	9/24/18	11:00-12:00
2	Dr Zanyar Faiq	LNG / ENG	Seminar	Western Culture: Precursors of Modernism	10/2/18	11:00-12:01
3	Dr Zanyar Faiq	LNG / ENG	Seminar	Western Culture: Structuralism	10/9/18	13:00-15:00
4	Dr Zanyar Faiq	LNG / ENG	Seminar	Western Culture: Postmodernism	11/4/18	13:00-15:00
5	Dr Abdulkarim Uzeri	LNG / ENG	Seminar	An Introduction to Kurdish-English Translation	11/20/18	13:30-14:30
6	Dr Ananta Singh	BUS / BUS	Webinar	Challenges and Experiences of Heading a Marketing Team of Real State Company	11/20/18	10:00-11:00
7	Prof Dr Hamid Ghafori Dr Dorababu Neeraugatti	MED / PHY	Seminar	Preparation and Treatment Processes	2/28/19	9:30-11:30
8	Mr. Balen Jaff	OSAR	Seminar	Public Speaking Championship	3/5/19	10:30-11:30
9	Jaza Mahmood	ENG / CMP	Seminar	Fitness Dependent Optimizer: Inspired by the Bee Swarming Reproductive Process View Larger Image	4/17/19	14:00-15:00

| 10 | Dr Kristiina Koivunen | OPA | Seminar | Kirkuk, Multicultural City - Hope for Peaceful Future | 4/25/19 | 10:00-12:00 |
| 11 | Ms Hana Raza | QA / KRC | Seminar | Distribution and Habitat Use of the Persian Leopard and Its Prey inthe Northern Zagros Mountains | 5/26/19 | 10:30-12:30 |

List of Panels during Fall 2018 & Spring 2019

	Name of speaker	College/Department	Type of event	Title	Date	Time
1	Dr. Sumar Fahrettin	BUS / BUS	Panel	Non-economic factors and financial crisis	2/21/19	15:00-16:00

List of Symposiums during Fall 2018 & Spring 2019					
Name of speaker	**College/Department**	**Type of event**	**Title**	**Date**	**Time**
1 Dr Asos Rasoul Dr Ali Yaseen Dr Osman Sharif	MED / PHY / CMP	Symposium	Drug Discovery, Development and Regulations	2/14/19	9:00-11:00
2 Prof Dr Shanaz Gaphor Prof Dr Soza Abdul Aziz Dr Sana Salahaddin	MED / DEN	Symposium	Oral Health Problems	2/25/19	9:30-11:30
3 Dr Mariam Ghanbariha Dr Yad Zangana Assist Prof Dr Faraedon Zardawi	MED / DEN	Symposium	Smoking and Dental Implant	4/22/19	10:00-12:00

List of Trainings during Fall 2018 & Spring 2019					
Name of speaker	**College/Department**	**Type of event**	**Title**	**Date**	**Time**
1	Mr Twana A Tahir Dr Hamid Farangis Zadeh	QA / KRC	Training	Pedagogical Reform	1/21/19	9:00-16:00
2	Mr Twana Abdulrazaq	QA	Training	Pedagogical Training for CIEP Instructors	2/27/19	12:30-15:30

	Name of Author (order)	Title of paper	Journal	Date	Indexing	IF	DOI
		KUST List of Published Papers Fall 2018 & Spring 2019					
1	Shujahadeen Aziz (1st) Omed Abdullah (3rd)	Impedance Spectroscopy as a Novel Approach to Probe the Phase Transition and Microstructures Existing in CS:PEO Based Blend Electrolytes	Scientific Report	Sep-18	Clarivate Analytics	4.122	https://doi.org/10.1038/s41598-018-32662-1
2	Khalid Omer (1s)	Solvothermal synthesis of phosphorus and nitrogen doped carbon quantum dots as a fluorescent probe for iron(III).	Microchimica Acta	Sep-18	Clarivate Analytics	5.705	https://10.1007/s00604-018-3002-4
3	Pshko Abdulrahman (1st)	Self-phase modulation and spectral broadening in millimeter long self-written polymer waveguide integrated with single mode fibers	Optical Materials	Oct-18	Scopus	2.32	https://doi.org/10.1016/j.optmat.2018.10.001
4	Khalid Omer (1s) Dlzar Ghafour (3rd)	Highly photoluminescent label free probe for Chromium (II) ions using carbon quantum dots co-doped with nitrogen and phosphorous	Journal of Luminescence	Oct-18	Clarivate Analytics	2.737	https://doi.org/10.1016/j.jlumin.2018.10.100
5	Shujahadeen Aziz (1st)	The compatibility of chitosan with divalent salts over monovalent salts for the preparation of solid polymer electrolytes	Results in Physics	Oct-18	Clarivate Analytics	2.147	https://doi.org/10.1016/j.rinp.2018.10.040
6	Shujahadeen Aziz (1st)	The Study of Dielectric Properties and Conductivity Relaxation of Ion Conducting Chitosan:NaTf Based Solid Electrolyte	International Journal of ELECTROCHEMICAL SCIENCE	Oct-18	Clarivate Analytics	1.369	doi: 10.20964/2018.11.05
7	Khalid Omer (1s)	Photoluminescence enhancement via microwave irradiation of carbon quantum dots derived from solvothermal of L-Arginine	New Journal of Chemistry	Nov-18	Clarivate Analytics	3.201	https://doi.org/10.1039/C8NJ04788J
8	Omed Abdullah (2nd) Shujahadeen Aziz (1st)	Characterization of Pure and Pb2+ ion Doped Methylcellulose Based Biopolymer Electrolyte Films: Optical and Electrical Properties	International Journal of	Nov-18	Clarivate Analytics	1.369	http://doi:10.20964/2018.12.34

			ELECTROCHEMICAL SCIENCE				
9	Mohammad Ahmad (1st)	The Role of Information Technology on Teaching Process in Education; An Analytical Prospective Study at University of Sulaimani	International Journal of Advanced Computer Science and Applications	Nov-18	Clarivate Analytics		DOI: 10.14569/IJACSA.2018.091172
10	Omed Abdullah (2nd)	Hydrogen sulfide sensors based on PANI/f-SWCNT polymer nanocomposite thin films prepared by electrochemical polymerization	Journal of Science: Advanced Materials and Devices	Nov-18	Scopus		doi.org/10.1016/j.jsamd.2018.11.006
11	Omed Abdullah (3rd)	Characterization and NO2 gas sensing performance of CdO:In2O3 polycrystalline thin films prepared by spray pyrolysis technique	SN Applied Sciences	Nov-18	Google Scholar		DOI: 10.1007/s42452-018-0076-x
12	Pshko Mohammad (1st)	Improvement of optical and mechanical properties of self-written polymer waveguides attached to optical fibers	Optical Materials	Dec-18	Scopus	2.33	https://doi.org/10.1016/j.optmat.2018.12.003
13	Shujahadeen Aziz (2nd)	Protonic cell performance employing electrolytes based on plasticized methylcellulose-potato starch-NH4NO3	Ionics	Dec-18	Scopus	2.32	https://doi.org/10.1007/s11581-018-2827-5
14	Shujahadeen Aziz (1st) Omed Abdullah (2nd)	Solid Polymer Electrolytes Based on Chitosan: NH4Tf Modified by Various Amounts of TiO2 Filler and its Electrical and Dielectric Characteristics	International Journal of ELECTROCHEMICAL SCIENCE	Jan-19	Clarivate Analytics	1.369	doi:10.20964/2019.02.31
15	Hiwa Sidiq (1st)	Reservoir simulation study of enhanced oil recovery by sequential polymer flooding method	Advances in Geo-Energy Research	Feb-19	DOAJ		10.26804/ager.2019.02.01
16	Hersh A. Ham-Karim	Targeted Next-Generation Sequencing Validates the Use of Diagnostic Biopsies as a Suitable Alternative to Resection Material for Mutation Screening in Colorectal Cancer	Molecular Diagnosis & Therapy	Feb-19	Clarivate Analytics	2.716	https://doi.org/10.1007/s40291-019-00388-z
17	Shujahadeen Aziz (1st)	Structural and Optical Characteristics of PVA:C-Dot Composites: Tuning the Absorption of Ultra Violet (UV) Region	Nanomaterials	Feb-19	Clarivate Analytics	3.5	https://doi.org/10.3390/nano9020216

18	Nzar RaufAbdullah (3rd)	Coexisting spin and Rabi oscillations at intermediate time regimes in electron transport through a photon cavity	Beilstein Journal of Nanotechnology	Mar-19	Clarivate Analytics	2.97	doi:10.3762/bjnano.10.61
19	Omed Abdullah (1st)	Structural and electrical conductivity of CH:MC bio-poly-blend films: optimize the perfect composition of the blend system	Bulletin of Materials Science	Mar-19	Clarivate Analytics	0.925	https://doi.org/10.1007/s12034-019-1742-3
20	Heshu Sulaiman (3rd)	Antiproliferative and antiangiogenic effects of zerumbone from Zingiber zerumbet L. Smith in sprague dawley rat model of hepatocellular carcinoma	Pharmacognosy Magazine	Mar-19	Clarivate Analytics	1.525	DOI: 10.4103/pm.pm_118_18
21	Shujahadeen Aziz (1st)	Dextran from Leuconostoc mesenteroides-doped ammonium salt-based green polymer electrolyte	Bulletin of Materials Science	Mar-19	Clarivate Analytics	0.925	https://doi.org/10.1007/s12034-019-1740-5
22	Nzar RaufAbdullah (1st)	Photon-Mediated Thermoelectric and Heat Currents through a Resonant Quantum Wire-Cavity System	Energies	Mar-19	Clarivate Analytics	2.676	doi:10.3390/en12061082
23	Ali Hussein Hassan (2nd)	Effect of Shogaol on the Expression of Intestinal Stem Cell Markers in Experimentally Induced Colitis in BALB/c Mice	Analytical Cellular Pathology	Mar-19	Clarivate Analytics	1.574	https://doi.org/10.1155/2019/5134156
24	Shujahadeen Aziz (1st)	Structural, Thermal, Morphological and Optical Properties of PEO Filled with Biosynthesized Ag nanoparticles: New Insights to Band Gap Study	Results in Physics	Mar-19	Clarivate Analytics	2.147	https://doi.org/10.1016/j.rinp.2019.102220
25	Ako Rashed Hama (1st)	A multi-criteria GIS model for suitability analysis of locations of decentralized wastewater treatment units: case study in Sulaimania, Iraq	Heliyon	Mar-19	Clarivate Analytics		https://doi.org//10.1016/j.heliyon.2019.e01355
26	Prof Salahalddin S. Ali	Hydrogeochemical Evaluation of Groundwater and Its Suitability for Domestic Uses in Halabja Saidsadiq Basin, Iraq	Water	Apr-19	Clarivate Analytics	2.069	https://doi.org/10.3390/w11040690
27	Jaza Mahmood (1st)	Fitness Dependent Optimizer: Inspired by the Bee Swarming Reproductive Process	IEEE Access	Apr-19	Clarivate Analytics	3.557	10.1109/ACCESS.2019.2907012
28	Kosar Hikmat (1st)	Application of different advanced oxidation processes for the removal of chloroacetic acids using a planar falling film reactor.	Chemosphere	May-19	Clarivate Analytics	4.427	10.1016/j.chemosphere.2019.04.160

29	Kosar Hikmat (1st)	Development and Application of Different Non-thermal Plasma Reactors for the Removal of Perfluorosurfactants in Water: A Comparative Study	Plasma Chemistry and Plasma Processing	May-19	Clarivate Analytics	2.658	https://doi.org/10.1007/s11090-019-09977-6)
30	Shujahadeen Aziz (1st)	Increase of Metallic Silver Nanoparticles in Chitosan:AgNt Based Polymer Electrolytes Incorporated with Alumina Filler	Results in Physics	May-19	Clarivate Analytics	2.147	https://doi.org/10.1016/j.rinp.2019.102326
31	Nzar RaufAbdullah (1st)	Thermoelectric Inversion in a Resonant Quantum Dot-Cavity System in the Steady-State Regime	Nanomaterials	May-19	Clarivate Analytics	3.504	https://doi.org/10.3390/nano9050741
32	Khalid Omer (1s)	Lowering the detection limit towards nanomolar mercury ion detection via surface modification of N-doped carbon quantum dots	New Journal of Chemistry	May-19	Clarivate Analytics	3.201	10.1039/C9NJ01333D
33	Omed Abdullah (2nd)	Numerical analysis of heat removal from gas phase clusters during condensation of Cu nanoparticles under Ar atmosphere	Results in Physics	Mar-19	Clarivate Analytics	2.147	https://doi.org/10.1016/j.rinp.2019.102287
34	Omed Abdullah (2nd)	Preparation and Composition Optimization of PEO:MC Polymer Blend Films to Enhance Electrical Conductivity	Polymers	Mar-19	Clarivate Analytics	2.935	https://doi.org/10.3390/polym11050853
35	Hersh A. Ham-Karim (1st)	Targeted Next-Generation Sequencing reveals a common genetic pathway for colored cancers	Pathology-Research and Practice	May-19	Clarivate Analytics	3.935	10.1016/j.prp.2019.152445
36	Hawzheen A. Muhammad	Treatment Outcomes of Pediatric Patients With Ewing Sarcoma in a War-Torn Nation: A Single-Institute Experience From Iraq	Journal of Global Oncology	May-19	DOAJ		10.1200/JGO.18.00122
37	Hiwa Sidiq (1st)	Upscaling Gas-Water Relative Permeability Measurements from Ambient to Reservoir Condition	Journal of Porous Media	May-19	Clarivate Analytics	1.061	DOI: 10.1615/JPorMedia.2019026828
38	Ako Rashed Hama (1st)	Use of Alum and Polyelectrolyte Coagulants as Admixtures in Concrete Bunkers Production.	The Sulaimani Journal for Engineering Sciences	May-19			https://doi.org/10.17656/sjes.10073
39	Ako Rashed Hama (6th)	Mercury removal from water using deep eutectic solvents-functionalized multi walled carbon nanotubes: Nonlinear autoregressive network with an exogenous input neural network approach	Environmental Progress & Sustainable Energy	May-19	Clarivate Analytics	1.326	https://doi.org/10.1002/ep.13261

40	Khalid Omer (1s)	Dual-mode colorimetric and fluorometric probe for ferric ion detection using N-doped carbon dots prepared via hydrothermal synthesis followed by microwave irradiation	Optical Materials	May-19	Scopus	2.33	https://doi.org/10.1016/j.optmat.2019.05.045
41	Shujahadeen Aziz (2nd)	Reducing the Crystallite Size of Spherulites in PEO-Based Polymer Nanocomposites Mediated by Carbon Nanodots and Ag Nanoparticles	Nanomaterials	May-19	Clarivate Analytics	3.504	https://doi.org/10.3390/nano9060874
42	Muhammad Ali (5th)	Influence of lauryl betaine on aqueous solution stability, foamability and foam stability	Journal of Petroleum Exploration and Production Technology	May-19	DOAJ		https://doi.org/10.1007%2Fs13202-019-0652-7
43	Shujahadeen Aziz (1st)	Development of Polymer Blend Electrolyte Membranes Based on Chitosan: Dextran with High Ion Transport Properties for EDLC Application	International Journal of Molecular Sciences	May-19	Clarivate Analytics	4.183	https://doi.org/10.3390/ijms20133369
44	Heshu Sulaiman (5th)	Antiangiogenic properties of nanoparticles: a systematic review	International Journal of Nanomedicine	Jul-19	Clarivate Analytics	4.471	https://doi.org/10.2147/IJN.S199974
45	Heshu Sulaiman (5th)	Preparation and Characterization of Self Nano-Emulsifying Drug Delivery System Loaded with Citraland Its Antiproliferative Effect on Colorectal Cells In Vitro.	Nanomaterials	Jul-19	Clarivate Analytics	4.034	https://doi.org/10.3390/nano9071028
46	Kosar Hikmat (1st)	Application of Photocatalytic Falling Film Reactor to Elucidate the Degradation Pathways of Pharmaceutical Diclofenac and Ibuprofen in Aqueous Solutions	Coatings	Jul-19	Clarivate Analytics	2.33	https://doi.org/10.3390/coatings9080465
47	Shujahadeen Aziz (1st)	A Promising Polymer Blend Electrolytes Based on Chitosan: Methyl Cellulose for EDLC Application with High Specific Capacitance and Energy Density	Molecules	Jul-19	Clarivate Analytics	3.06	https://doi.org/10.3390/molecules24132503
48	Khalid Omer (1s)	Improvement of selectivity via the surface modification of carbon nanodots towards the quantitative detection of mercury ions	New Journal of Chemistry	Jul-19	Clarivate Analytics	3.069	doi:10.1039/C9NJ03057C

49	Shujahadeen Aziz (1st)	High Proton Conducting Polymer Blend Electrolytes Based on Chitosan:Dextran with Constant Specific Capacitance and Energy Density	Biomolecules	Jul-19	Clarivate Analytics	4.694	https://doi.org/10.3390/biom9070267
50	Nzar RaufAbdullah (1st)	Manifestation of the Purcell Effect in Current Transport through a Dot–Cavity–QED System	Nanomaterials	Jul-19	Clarivate Analytics	4.034	https://doi.org/10.3390/nano9071023
51	Shujahadeen Aziz (3rd)	Structural Characterization, Antimicrobial Activity, and In Vitro Cytotoxicity Effect of Black Seed Oil	Evidence-Based Complementary and Alternative Medicine	Aug-19	Scopus	1.984	https://doi.org/10.1155/2019/6515671
52	Nzar RaufAbdullah (2nd)	Silicon on a graphene nanosheet with triangle- and dot-shape: Electronic structure, specific heat, and thermal conductivity from first-principle calculations	Results in Physics	Aug-19	Clarivate Analytics	2.147	https://doi.org/10.1016/j.rinp.2019.102625
53	Shujahadeen Aziz (1st)	Fabrication of Energy Storage EDLC Device Based on CS:PEO Polymer Blend Electrolytes with High Li+ Ion Transference Number	Results in Physics	Aug-19	Clarivate Analytics	2.147	https://doi.org/10.1016/j.rinp.2019.102584
54	Prof Salahalddin S. Ali	Landfill Site Selection Using MCDM Methods and GIS in the Sulaimaniyah Governorate, Iraq	Sustainability	Aug-19	Clarivate Analytics	2.59	https://doi.org/10.3390/su11174530
55	Shujahadeen Aziz (2nd)	From Green Remediation to Polymer Hybrid Fabrication with Improved Optical Band Gaps	International Journal of Molecular Sciences	Aug-19	Clarivate Analytics	4.183	https://doi.org/10.3390/ijms20163910

KUST List of Published Books during Fall 2018 & Spring 2019

	Name of Author	Title of Book (Chapter)	Publisher	Date	Link
1	Prof Salahalddin S. Ali	Land Use Classification and Change Detection Using Multi-temporal Landsat Imagery in Sulaimaniyah Governorate, Iraq	Springer	Dec-18	PISBN: 978-3-030-01439-1, OISBN: 978-3-030-01440-7
2	Hamid Ghafoori	RIA Technology of Cyclic Nucleotides	NOOR Publishing House	Jul-19	https://www.morebooks.shop/store/gb/book/ria-technology-ofcyclic-nucleotides/isbn/978-3-330-97694-8
3	Bayad Jamal	Brand Building in the Consumer Electronics industry in iraq	LAMPERT Academic Publishing	Aug-19	https://www.morebooks.de/store/gb/book/brand-buildingin-the-consumer-electronics-industry-in-iraq/isbn/978-620-0-24869-5
4	Bayad Jamal	Iraq Stock Market and its Role in the Economy	LAMPERT Academic Publishing	Aug-19	https://www.morebooks.shop/store/gb/book/iraq-stockmarket-and-its-role-in-the-economy/isbn/978-3-659-63427-7

RIA Technology Of Cyclic Nucleotides

The aim of this book is to facilitate the recent technology of the determination and manufacturing the cytidine-3',5'- cyclic monophosphate by applying radioimmunoassay technology, as a RIA kit determination. The protocol of the research was focused on the preparation of a specific antigen derivatives by using organic synthesis protocol and then secretion of the specific antibody using rabbits animal. A specific buffers were prepared for the protocol. A hot tracer of the antigen was also synthesized using Sodium iodide 125 isotope. the protocol of synthesis was applied on different malignant tissues in addition to plant tissues.
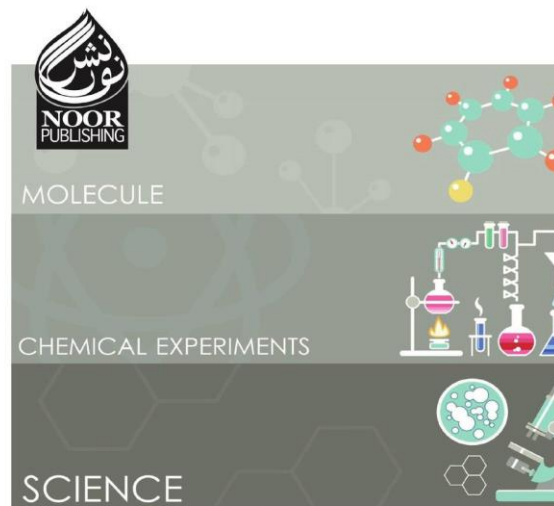
Ria Technology Of Cyclic Nucleotides

HAMID GHAFFOORI HASAN (BSc, MSc, PhD) Prof Clinical Biochemistry. Born in 1946, Bsrah (IRAQ). Recently Prof. Hasan appointed at KOmar University of Science and Technology, Sulaimania, Kurdistan, IRAQ Prof Hasan interested in the field of Hormones and their radioimmunoassay application.

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RIA Technology Of Cyclic Nucleotides

Hasan

Ethics—Knowledge—Skills

Brand building and branding is an important concept in management that gives an identity to businesses and has been important lately in implementing business strategy that is planning to leave an impression to the market and the customers. In consumer electronics products, the importance of technology is rather significant; however, the brand name in the consumer electronics industry is crucial for the consumer purchasing decision making. Therefore, this thesis wants to highlight the advantage of brand building and how the strength of a brand helps to gain competitive advantage over competitors.

Bayad Jamal Ali

Brand Building in the Consumer Electronics Industry in Iraq

Dr Bayad Jamal Ali is an academic and a businessman, he has a Doctorate in Business Administration from Paris School of Business, he is a lecturer at Komar University of Science and Technology and the CEO of Bayad Group.

978-620-0-24869-5

LAMBERT Academic Publishing

Stock Exchanges play a significant role in the economies today, they facilitate the transfer of wealth, helping startups gain capital, and becoming an indicator to show the health of an economy. Iraq Stock Exchange has been established to play its role since after the regime change in 2003, yet many political, economic, and security obstacles are created in its path. This study examines the confidence level of the public and stakeholders in the stock exchange and its ability to deliver.

The Confidence in Iraq Stock Exchange

Bayad Jamal Ali

Iraq Stock Market and its Role in the Economy

Dr. Bayad Jamal Ali is an academic and businessman, he has a Doctorate in Business Administration from Paris School of Business, he is a lecturer at Komar University of Science and Technology and the CEO of Bayad Group.

Jamal Ali

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Hydrogeochemical Evaluation of Groundwater and Its Suitability for Domestic Uses in Halabja Saidsadiq Basin, Iraq

Twana O. Abdullah [1,2], Salahalddin S. Ali [3,4], Nadhir A. Al-Ansari [2,*] and Sven Knutsson [2]

[1] Groundwater Directorate of Sulaimani, Kurdistan Region 46001, NE, Iraq; twana.abdullah@ltu.se

[2] Division of Mining and Geotechnical Engineering, Department of Civil, Environmental and Natural Resources and Engineering, Lulea University of Technology, 971 87 Luleå, Sweden; Sven.Knutsson@ltu.se

[3] Department of Geology, University of Sulaimani, Kurdistan Region 46001, NE, Iraq; salah.saeed@komar.edu.iq

[4] Komar University of Science and Technology, Sulaimani 46001, Iraqi Kurdistan Region, Iraq

* Correspondence: nadhir.alanasari@ltu.se

Abstract: Evaluation of the hydrogeochemical characteristics and groundwater suitability for domestic use was conducted in the Halabja Saidsadiq Basin in the northeastern part of Iraq. The total studied area is about 1278 km^2 with a specific Mediterranean-type continental interior climate, which is cold in winter and hot in summer. To conduct the required laboratory chemical analysis for groundwater samples in the studied basin, 78 groundwater samples, in total, were collected from 39 water wells in the dry and wet seasons in 2014 and analyzed for major cations and anions, and the results were compared with the permitted limits for drinking water. An examination of the chemical concentrations of the World Health Organization drinking water norms demonstrate that a large portion of the groundwater samples is suitable for drinking, and a preponderance of groundwater samples situated in the class of hard and very hard water types for both seasons. Suitability of groundwater for drinking use was additionally assessed according to the water quality index classification. This showed that more than 98% of groundwater samples have good water quality in the dry and wet seasons. Conversely, the classification of groundwater samples based on Piper's diagram designates that the groundwater type is alkaline water, with existing bicarbonate along with sulfate and chloride. However, water–rock exchange processes and groundwater flow have been responsible for the dominant water type of Ca–Mg–HCO$_3$.

Keywords: hydrogeochemistry; water quality index; domestic use; Halabja Saidsadiq Basin

1. Introduction

The deficiencies in freshwater resources have turned into an essential issue facing the world. Therefore, groundwater is of specific significance regarding civic domestic water supply, particularly for the residents of arid and semi-arid regions [1]. However, rapid urbanization and increasing populations have accelerated the consumption of groundwater resources and caused serious environmental problems in the last few decades [2], and various studies have shown severe groundwater contamination. It is well known that the mineral composition of water has a reflective impact on soil composition and plant growth. Therefore, the classification system for evaluating the quality of groundwater for drinking purposes can be established by analyzing several related chemical elements, including Ca^{2+}, Mg^{2+}, Na^+, K^+, Cl^-, SO_4^{2-}, HCO_3^-, and NO_3^-, and assessing several physical properties like (acidity or alkalinity (pH), electrical conductivity (EC), temperature, total dissolved solid (TDS), and total hardness (TH)).

Article

Landfill Site Selection Using MCDM Methods and GIS in the Sulaimaniyah Governorate, Iraq

Karwan Alkaradaghi [1,2,3], **Salahalddin S. Ali** [2,4,5], **Nadhir Al-Ansari** [1,*] , **Jan Laue** [1] and **Ali Chabuk** [1]

1   Department of Civil, Environmental and Natural Resources Engineering, Lulea University of Technology, 97187 Lulea, Sweden
2   Department of Geology, College of Science, Sulaimani University, Sulaimaniyah 460013, Iraq
3   Kurdistan Institution for Strategic Studies and Scientific Research, Sulaimaniyah 460013, Iraq
4   Komar University of Science and Technology, Sulaimaniyah 460013, Iraq
5   Komar Research Center, Sulaimaniyah 460013, Iraq
*   Correspondence: nadhir.alansari@ltu.se; Tel.: +46-725-390-767

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Abstract: A shortage of land for waste disposal is one of the serious problems that faces urban areas in developing countries. The Sulaimaniyah Governorate, located in the north of Iraq, is one of the major cities in the Kurdistan Region of the country, covering an area of 2400 km^2 with a population of 856,990 in 2016. Currently, there is no landfill site in the study area that meets scientific and environmental criteria, and inappropriate solid waste dumping is causing negative environmental impacts. The process of landfill site selection is considered a complex process and is restricted by numerous factors and regulations. This paper proposes multi-criteria decision-making (MCDM) methods in a model for landfill site decision. The model assumes the input of two groups of factors that need to satisfy the optimal values of weight coefficients. These groups of constants are natural factors and artificial factors, and they included thirteen selected criteria: slope, geology, land use, urban area, villages, rivers, groundwater, slope, elevation, soil, geology, road, oil and gas, land use, archaeology and power lines. The criteria were used in the geographic information system (GIS), which has a high capacity to process and analyze various data. In addition, multi-criteria decision-making (MCDM) methods followed by the weighted linear combination (WLC) method were used to derive criteria weightings using a matrix of pair-wise comparison. Finally, all the multi criteria decision methods were combined to obtain an intersection of the suitability index map for candidate landfill sites. Seven appropriate sites for landfill were suggested, all of which satisfied the scientific and environmental criteria which were adopted in this study.

Keywords: landfill site; GIS software; MCDM methods; criteria weights; suitability index

1. Introduction

Municipal solid waste (MSW) is the main by-product of urban life. Approximately 3.5 million tons of MSW are generated daily on a global scale [1]. Population growth, improving standards of living after economic recovery, and industrial activities are all major reasons for a significant increase in solid waste quantity output in urban areas [2].

The problem of solid waste is very serious in developing countries. About 80% of the world population are living in these countries [3]. Due to the situation of these countries, such waste is affecting humans and their environment. For this reason, legislations and laws have been developed since the mid-twentieth century to ensure sustainable development and management of waste in a prudent manner to minimize the effect on human and environment [4]. This article offers a method

Preparation and Composition Optimization of PEO:MC Polymer Blend Films to Enhance Electrical Conductivity

Hawzhin T. Ahmed [1,2] and Omed Gh. Abdullah [2,3,*]

[1] Department of General Science, College of Education and Language, University of Charmo, Chamchamal 46023, Kurdistan Region, Iraq; hawzhin.taha@charmouniversity.org

[2] Advanced Materials Research Laboratory, Department of Physics, College of Science, University of Sulaimani, Sulaimani 46001, Kurdistan Region, Iraq

[3] Komar Research Center, Komar University of Science and Technology, Sulaimani 46001, Kurdistan Region, Iraq

* Correspondence: omed.abdullah@univsul.edu.iq; Tel.: +9647702400280; Fax: +447043121313

Abstract: The polymer blend technique was used to improve amorphous phases of a semicrystalline polymer. A series of solid polymer blend films based on polyethylene oxide (PEO) and methylcellulose (MC) were prepared using the solution cast technique. X-ray diffraction (XRD), Polarized optical microscope (POM), Fourier transform infrared (FTIR) and electrical impedance spectroscopy (EIS) were used to characterize the prepared blend films. The XRD and POM studies indicated that all polymer blend films are semicrystalline in nature, and the lowest degree of crystallinity was obtained for PEO:MC polymer blend film with a weight ratio of 60:40. The FTIR spectroscopy was used to identify the chemical structure of samples and examine the interactions between chains of the two polymers. The interaction between PEO and MC is evidenced from the shift of infrared absorption bands. The DC conductivity of the films at different temperatures revealed that the highest conductivity 6.55×10^{-9} S/cm at ambient temperature was achieved for the blend sample with the lowest degree of crystallinity and reach to 26.67×10^{-6} S/cm at 373 K. The conductivity relaxation process and the charge transport through the hopping mechanism have been explained by electric modulus analysis. The imaginary part of electrical modulus M'' shows an asymmetrical peak, suggesting a temperature-dependent non-Debye relaxation for the PEO:MC polymer blend system.

Keywords: polymer blend films; crystallinity; optical micrographs; impedance spectroscopy; electrical modulus

1. Introduction

Polymeric materials have been receiving great research attention due to their advantages, such as light-weight, low-cost, high flexibility, good mechanical properties, and ease of fabrication in thin film form [1]. These properties make them ideal materials for a broad range of applications in optical, biomedical, and electronic devices [2]. It has been established that the features of the polymeric materials depend mainly on the composition and attachment of monomers; therefore, many research groups have attempted to manipulate the characteristics of polymers to create materials with specific chemical, physical, and biological properties for a particular application [3]. Currently, the research interests have been focused on the solid polymer electrode-based films, because of the possible application in organic solar cells, sensors, and electrochemical devices [4–6].

Investigations on solid polymer electrolytes have focused mainly on the improvement of the ionic conductivities at ambient temperature [7]. However, polymeric materials possess some restrictions

Article

Structural and Optical Characteristics of PVA:C-Dot Composites: Tuning the Absorption of Ultra Violet (UV) Region

Shujahadeen B. Aziz [1,2,*] ![ORCID], **Aso Q. Hassan** [3], **Sewara J. Mohammed** [3], **Wrya O. Karim** [3], **M. F. Z. Kadir** [4], **H. A. Tajuddin** [5] **and N. N. M. Y. Chan** [5]

[1] Advanced Polymeric Materials Research Laboratory, Department of Physics, College of Science, University of Sulaimani, Qlyasan Street, Sulaimani 46001, Kurdistan Regional Government, Iraq
[2] Komar Research Center (KRC), Komar University of Science and Technology, Sulaimani 46001, Kurdistan Regional Government, Iraq
[3] Department of Chemistry, College of Science, University of Sulaimani, Qlyasan Street, Sulaimani 46001, Kurdistan Regional Government, Iraq; aso.hassan@univsul.edu.iq (A.Q.H.); sewara.mohammed@univsul.edu.iq (S.J.M.); wrya.karim@univsul.edu.iq (W.O.K.)
[4] Centre for Foundation Studies in Science, University of Malaya, Kuala Lumpur 50603, Malaysia; mfzkadir@um.edu.my
[5] Department of Chemistry, College of Science, University of Malaya, Kuala Lumpur 50603, Malaysia; hairul@um.edu.my (H.A.T.); nadianabihahchan@gmail.com (N.N.M.Y.C.)
[*] Correspondence: shujahadeenaziz@gmail.com

Abstract: In this work the influence of carbon nano-dots (CNDs) on absorption of ultra violet (UV) spectra in hybrid PVA based composites was studied. The FTIR results reveal the complex formation between PVA and CNDs. The shifting was observed in XRD spectrum of PVA:CNDs composites compared to pure PVA. The Debye-Scherrer formula was used to calculate the crystallite size of CNDs and crystalline phases of pure PVA and PVA:CNDs composites. The FESEM images emphasized the presence and dispersion of C-dots on the surface of the composite samples. From the images, a strong and clear absorption was noticed in the spectra. The strong absorption that appeared peaks at 280 nm and 430 nm can be ascribed to the n-π* and π-π* transitions, respectively. The absorption edge shifted to lower photon energy sides with increasing CNDs. The luminescence behavior of PVA:CNDs composite was confirmed using digital and photo luminescence (PL) measurements. The optical dielectric constant which is related to the density of states was studied and the optical band gap was characterized accurately using optical dielectric loss parameter. The Taucs model was used to determine the type of electronic transition in the samples.

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1. Introduction

Since the invention of carbon nano-tubes (CNTs), carbon-based nano-materials have been widely investigated. Carbon quantum dots (CQDs) currently represent the newest class of carbon-based materials as a potential alternative to CNTs for sustainable applications [1]. Carbon nano-dots (CNDs) as a new carbon nano-material with discrete, quasi-spherical carbon nano-particles and ultrafine size of almost 10 nm can be used as a building block for fluorescence systems [2]. Several advantageous characteristics of C-dots, such as an abundance of carbon sources, low cost, biodegradability and brilliant fluorescence behavior, make these new materials widely applicable. Moreover, chemical stability in the colloidal solution state, inertness and relatively high resistivity to photo-bleaching

Fitness Dependent Optimizer: Inspired by the Bee Swarming Reproductive Process

JAZA MAHMOOD ABDULLAH[ID][1,2] **AND TARIK AHMED RASHID**[ID][3], **(Member, IEEE)**
[1]Information Technology Department, College of Commerce, University of Sulaimani, Sulaymaniyah, Iraq
[2]Computer Engineering Department, College of Engineering, Komar University of Science and Technology, Sulaymaniyah 65-1154, Iraq
[3]Computer Science and Engineering, University of Kurdistan Hewler (UKH), Erbil, KRG, Iraq

Corresponding author: Jaza Mahmood Abdullah (jaza.abdullah@univsul.edu.iq)

ABSTRACT In this paper, a novel swarm intelligent algorithm is proposed, known as the fitness dependent optimizer (FDO). The bee swarming the reproductive process and their collective decision-making have inspired this algorithm; it has no algorithmic connection with the honey bee algorithm or the artificial bee colony algorithm. It is worth mentioning that the FDO is considered a particle swarm optimization (PSO)-based algorithm that updates the search agent position by adding velocity (pace). However, the FDO calculates velocity differently; it uses the problem fitness function value to produce weights, and these weights guide the search agents during both the exploration and exploitation phases. Throughout this paper, the FDO algorithm is presented, and the motivation behind the idea is explained. Moreover, the FDO is tested on a group of 19 classical benchmark test functions, and the results are compared with three well-known algorithms: PSO, the genetic algorithm (GA), and the dragonfly algorithm (DA); in addition, the FDO is tested on the IEEE Congress of Evolutionary Computation Benchmark Test Functions (CEC-C06, 2019 Competition) [1]. The results are compared with three modern algorithms: (DA), the whale optimization algorithm (WOA), and the salp swarm algorithm (SSA). The FDO results show better performance in most cases and comparative results in other cases. Furthermore, the results are statistically tested with the Wilcoxon rank-sum test to show the significance of the results. Likewise, the FDO stability in both the exploration and exploitation phases is verified and performance-proofed using different standard measurements. Finally, the FDO is applied to real-world applications as evidence of its feasibility.

INDEX TERMS Optimization, swarm intelligence, evolutionary computation, metaheuristic algorithms, fitness dependent optimizer, FDO.

I. INTRODUCTION

From the time when computers were invented, searching for the unknown and looking for the best solution were points of focus. As early as 1945, Alan Turing used a type of search algorithm for breaking German Enigma ciphers during World War II [2]. To date, hundreds of types of algorithms have been developed for various purposes, including optimization problems. Optimization algorithms are used to find suitable solutions for a problem. There might be many different solutions for a single problem, but the optimum solution is preferable. Usually, optimization problems are nonlinear with a complex landscape. Generally, optimization algorithms can be classified into traditional and evolutionary algorithms. Traditional algorithms include gradient-based algorithms and quadratic programming. Evolutionary algorithms include heuristic or metaheuristic algorithms and many hybrid techniques.

Traditional algorithms are efficient in their work; however, several facts can be discussed about them. They are mostly deterministic; for example, a given input will always obtain the same output (except hill climbing when using random restart). Moreover, they perform local searches, which is why there is no guarantee that global optimality will be reached for most of the optimization problems. Consequently, they have limited diversity in the obtained solutions. Additionally, they use some information about the problems, and therefore, they tend to be problem-specific. Furthermore, these traditional algorithms cannot effectively solve multimodal problems because they do not work on highly nonlinear problems.

Evolutionary algorithms could be the correct answer to previous limitations as they have stochastic behaviors. They come in two forms: heuristic and meta-heuristic algorithms.

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OPEN

Impedance Spectroscopy as a Novel Approach to Probe the Phase Transition and Microstructures Existing in CS:PEO Based Blend Electrolytes

Shujahadeen B. Aziz[1,2], M. G. Faraj [ID][3] & Omed Gh. Abdullah [ID][1,2]

In this work the role of phase transition of PEO from crystalline to amorphous phases on DC conductivity enhancement in chitosan-based polymer electrolyte was discussed. Silver ion-conducting polymer electrolytes based on chitosan (CS) incorporated with silver nitrate (AgNt) is prepared via solution cast technique. Various amounts of polyethylene oxide (PEO) are added to the CS:AgNt system to prepare blend polymer electrolytes. Ultraviolet-visible (UV-vis) spectrophotometry is used to confirm that the blended samples containing AgNt salt exhibit a broad absorption peak. From optical micrograph images it is apparent that small white specs appear on the surface of the samples. The SEM results clearly show the aggregated silver nanoparticles. The enlargement of the crystalline area was observed from the morphological emergence and impedance plots. The phase separation in SEM images was observed at high PEO concentration. The XRD consequences support the morphological manifestation. In this study a new approach is offered to explore the microstructures existing in the blend electrolytes. The width of the semicircle linked to crystalline phase in impedance spectra was found to be increased with the increase of PEO concentration. A slow increase of DC conductivity was observed at low temperatures while above 333 K an immediate change in DC conductivity was obtained. The rapid rise of DC conductivity at high temperatures is correlated with the DSC results and impedance studies at high temperatures.

Solid polymer electrolytes (SPEs) have emerged as a new class of electrolyte materials for the replacement of the conventional organic sol–gel electrolyte. This is due to their long life, safety, processability, flexibility, and both electrochemical and dimensional stabilities[1]. They are promising materials since they tend to eliminate other problems of harmful gas production and corrosive solvent leakage along with their wider applications in electrochemical devices, fuel cells and electrochromic windows[2]. Polymer blending is a convenient method to create novel polymeric materials that are able to yield with the superior property profiles as compared to those of the individual components. This method is usually far less costly and time-consuming for the production of polymeric materials with new properties[3]. The polymer blending is also known to be one of the most promising and possible ways to enhance the ionic conductivity of polymeric electrolyte membranes. However, a high degree of polymeric blending can result in poor mechanical properties in SPEs[4]. It is well reported that polymer electrolytes with good mechanical stability are promising to be obtained with the polymer blending technique[5]. Chitosan (CS) is an organic biodegradable polymer-chelating membrane with non-porous structure. A pure chitosan film shows low ionic conductivity while it is a desirable material for film formation[6]. In our earlier works, for the chitosan-based solid electrolytes, the reductions of silver ions to silver nanoparticles have been observed[7–11]. The existences of lone pair electrons on chitosan functional groups are found to be responsible for the reduction of

[1]Prof. Hameed's Advanced Polymeric Materials Research Laboratory, Department of Physics, College of Science, University of Sulaimani, Sulaimani, Kurdistan Regional Government, Iraq. [2]Komar Research Center (KRC), Komar University of Science and Technology, Sulaimani, 46001, Kurdistan Regional Government, Iraq. [3]Department of Physics, Faculty of Science and Health, Koya University, University Park, Koysinjaq, Kurdistan Regional Government, Iraq. Correspondence and requests for materials should be addressed to S.B.A. (email: shujahadeenaziz@gmail.com)

Antiproliferative and Antiangiogenic Effects of Zerumbone from *Zingiber zerumbet* L. Smith in Sprague Dawley Rat Model of Hepatocellular Carcinoma

Nozlena Abdul Samad[1,2], Ahmad Bustamam Abdul[2], Heshu Sulaiman Rahman[3,4,5], Rasedee Abdullah[6], Tengku Azmi Tengku Ibrahim[6], Hemn Hassan Othman[7,8]

[1]Integrative Medicine Cluster, Sains@BERTAM, Advanced Medical and Dental Institute, Universiti Sains Malaysia, Kepala Batas, Penang, [2]Cancer Research Laboratory, Institute of Bioscience, Universiti Putra Malaysia, [5]Department of Cell and Molecular Biology, Faculty of Biotechnology and Biomolecular Sciences, Universiti Putra Malaysia, [6]Departments of Microbiology and Pathology and [7]Veterinary Pathology and Microbiology, Faculty of Veterinary Medicine, Universiti Putra Malaysia, Serdang, Selangor, Malaysia, [3]Department of Clinic and Internal Medicine and [8]Anatomy and Pathology, College of Veterinary Medicine, University of Sulaimani, [4]Department of Medical Laboratory Sciences, College of Science, Komar University of Science and Technology, Sulaimani City, Iraq

ABSTRACT

Context: Zerumbone (ZER) is known to exhibit anticancer properties on various cancer cells both *in vitro* and *in vivo*. However, the anti-angiogenesis effect of ZER on liver cancers *in vivo* is not yet addressed clearly. **Aims:** This study aimed to investigate the *in vivo* antiproliferative and antiangiogenesis effects of ZER using rats with diethylnitrosamine-induced hepatocellular carcinoma (HCC). **Materials and Methods:** The antiproliferative and anti-angiogenesis effects of ZER were determined using the hepatosomatic index, vascular endothelial growth factor (VEGF) immunoassay, terminal deoxynucleotidyl transferase dUTP nick end labeling assay, histopathology, and immunohistochemistry analysis. **Results:** Nontreated rats with HCC had higher median liver weight than those treated with ZER or suramin. The expression of VEGF, matrix metalloprotease, and Ki-67 that were high in nontreated HCC rats was down-regulated with ZER or suramin treatments. **Statistical Analysis Used:** Statistical analyses were performed using the Statistical Package for Social Science version 21.0 (SPSS Inc, IBM, Maryland, USA). The data were expressed as the mean ± standard deviation and analyzed using a one-way analysis of variance. $P < 0.05$ was considered statistically significant. **Conclusion:** ZER has the potential to be developed as the pro-apoptotic and antiangiogenic agent in the treatment of HCC.

Key words: Active compound, angiogenic biomarkers, antiproliferative, hepatocellular carcinoma, *in vivo* study, natural product

SUMMARY

- Cancer has the ability to spread to adjacent or distant organs through the formation of a new blood, and lymphatic vessels in a process called angiogenesis and lymphangiogenesis, respectively. Thus, studying the compounds that derived from natural products with antiangiogenic abilities are of great importance to reduce the chances of life-threatening diseases.

Abbreviations used: ZER: Zerumbone; HCC: Hepatocellular carcinoma; MMP-9: Matrix metalloproteinase-9; VEGF: Vascular endothelial growth factor; DEN: Diethylnitrosamine; PBS: Phosphate-buffered saline; ELISA: Enzyme-Linked Immunosorbent Assay; TUNEL: Terminal deoxynucleotidyl transferase dUTP nick end labeling; FFPE: Formalin-fixed and paraffin-embedded; H and E: Hematoxylin and Eosin; DAB: Dako Envision®+Dual Link System; HRP: Horseradish peroxidase; H_2O_2: Hydrogen peroxide; PBST: PBS in Tween 20; SPSS: Statistical Package for Social Science; RUGS: Research University Grant Scheme.
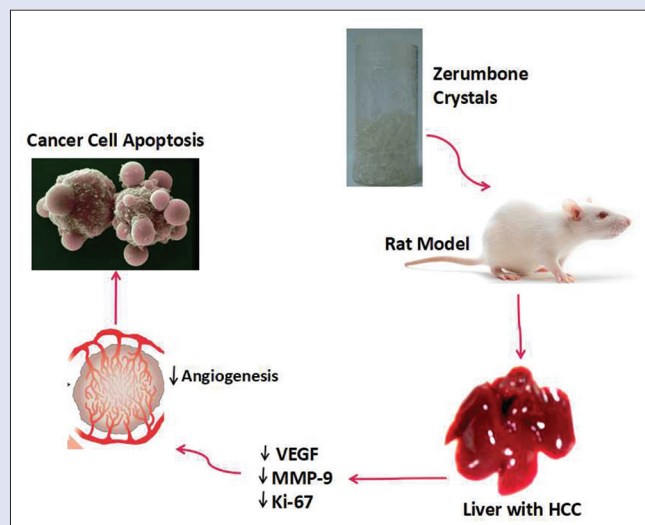
Correspondence:

Dr. Nozlena Abdul Samad,
Advanced Medical and Dental Institute, Universiti Sains Malaysia, 13200 Bertam, Kepala Batas, Penang, Malaysia.
E-mail: nozlena@usm.my
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INTRODUCTION

Zerumbone (ZER), a monocyclic sesquiterpene with chemical formula $C_{12}H_2O$ and molecular weight of 218.340 daltons, is most abundantly found in *Zingiber zerumbet* (L.) Smith. ZER was shown to have antiproliferative properties on cancer cells by inducing apoptosis and G2/M cell cycle arrest.[1]

Angiogenesis and neovascularization are tightly controlled by the intricate balance between pro- and anti-angiogenic factors.[2,3] In the

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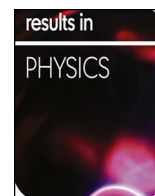
The compatibility of chitosan with divalent salts over monovalent salts for the preparation of solid polymer electrolytes

Shujahadeen B. Aziz[a,b,*], Shakahawan Al-Zangana[c], H.J. Woo[d], M.F.Z. Kadir[e], O. Gh. Abdullah[a,b]

[a] Prof. Hameeds Advanced Polymeric Materials Research Laboratory, Department of Physics, College of Science, University of Sulaimani, Rapareen Street, Sulaimani 46001, Kurdistan Region, Iraq
[b] Komar Research Center (KRC), Komar University of Science and Technology, Sulaimani 46001, Kurdistan Region, Iraq
[c] Department of Physics, College of Education, University of Garmian, Kalar 46021, Iraq
[d] Centre for Ionics, Faculty of Science, University of Malaya, Kuala Lumpur, Malaysia
[e] Centre for Foundation Studies in Science, University of Malaya, Kuala Lumpur, Malaysia

A B S T R A C T

In this study the compatibility of chitosan (CS) with divalent inorganic salt is discussed. Solid polymer electrolytes (SPEs) consist of CS as a host polymer and magnesium triflate (MgTf) as a dopant divalent salt have been prepared by solution cast technique. The room temperature DC ionic conductivity of CS-based SPE containing 50 wt% of MgTf is determined to be around $\approx 10^{-4}$ S/cm. The surface morphology of the films are then examined using a field emission scanning electron microscopy (FE-SEM). The crystalline phase of pure CS is found to reduce upon the addition of MgTf salt. The compatibility of CS with divalent salts are discussed at high salt concentration on the bases of the surface morphology and X-ray diffraction (XRD) results. The smooth surface micrographs and broad peaks of XRD spectra are interpreted in reference to lattice energy and cationic size of salt. The smooth surface and low resistance (R_b = 47.8 Ohm) at high salt content (50 wt%) are clear signs that CS is more compatible with divalent salts than with other monovalent salts. At low temperature range, the DC conductivity versus 1000/T is shown to follow the Arrhenius equation. The dispersion region of AC conductivity spectra has been used to calculate the frequency exponent, s. Based on the value of s as a function of temperature, different ion transport models have been discussed to interpret the pattern of DC ionic conductivity versus 1000/T. The appearance of peaks in M″ spectra and their absence in ε″ spectra reveals that the relaxation process is a non-Debye type.

Introduction

Since 1970, considerable attentions have been given to solid polymer electrolytes (SPEs) because of their potential technological applications in the field of solid state electrochemical devices, such as rechargeable batteries [1]. SPEs have several advantages as compared to conventional liquid electrolytes such as low flammability, leakage-free electrolytes, ease of fabrication, excellent mechanical flexibility, good thermal stability, safe and formation of stable contact between the electrode and electrolyte [2]. SPEs with excellent thermal and electrochemical stabilities are still highly required [3]. Solid biopolymer electrolyte system has recently gathered more attention. Low cost and environment friendliness makes the biopolymer a better choice than synthetic polymer [4,5]. One of the most considered natural biopolymers is chitosan (CS). It has several advantageous properties, such as

biodegradability and biocompatibility, which makes it widely employed in biomedical, pharmaceutical and industrial applications [6]. The unique properties that distinguish CS from other biopolymers are the presence of free amino (NH_2) and hydroxyl (OH) groups on the polymer backbone. Such groups are found to be very important in the process of dissolving inorganic salts within the host polymer [7–9]. CS is a hydrophilic biopolymer and it has excellent film-forming ability, non-toxic, and cost-effective [10]. SPEs are a safe, promising choice to assemble the challenges of battery applications, used as separator to avoid short circuits between anode and cathode during operation [11]. The long life, environmental safety, desired shape, low price and high energy density are factors which must be considered in the fabrication of rechargeable batteries [12]. The need for environmental-friendly rechargeable batteries with high performance is considered as a major global importance. So far, rechargeable lithium-based batteries with

Characterization of Pure and Pb^{2+} ion Doped Methylcellulose Based Biopolymer Electrolyte Films: Optical and Electrical Properties

Omed Gh. Abdullah[1,2,], Shujahadeen B. Aziz[1,2], Dlear R. Saber[1]*

[1] Advanced Materials Research Lab., Department of Physics, College of Science, University of Sulaimani, 46001, Kurdistan Region, Iraq.
[2] Komar Research Center, Komar University of Science and Technology, 46001, Sulaimani, Kurdistan Region, Iraq.
[*]E-mail: omedghareb@yahoo.com, omed.abdullah@univsul.edu.iq

Pb^{2+} ion-conducting biopolymer electrolyte films, based on methylcellulose (MC) were prepared, using the solution cast technique. The effect of Pb^{2+} doping concentration on the optical and electrical properties of host MC are described in this manuscript. Fourier transform infrared (FTIR) spectra indicated the occurrence of complexation between Pb^{2+} and biopolymer host in the synthesis biopolymer-based electrolyte films. Ultraviolet-visible (UV-Vis) spectroscopy accounts for a considerable continuous decline in optical band gap and band tail energy, which attributed to the formation of charge-transfer complex and increasing in the crystalline nature of the polymer electrolyte films, respectively. The dispersion of the refractive index was discussed in term of the single-oscillator model. The frequency-dependent electrical conductivity and dielectric constants of the prepared samples were investigated as a function of temperature and frequency by impedance spectroscopy. Temperature-dependent behavior of the frequency-exponent reveals that the correlated barrier hopping (CBH) model is the most suitable model to describe the conduction mechanism for the present system. The highest value of ion conductivity at ambient temperature was found to be 2.68×10^{-6} S/m for the polymer incorporated with 20 wt.% Lead acetate. The non-Debye type relaxation behaviour has been confirmed by the asymmetric relaxation peak of the imaginary part of the electric modulus. The present biopolymer electrolyte films were specified as promising materials for electrochemical device applications.

Coexisting spin and Rabi oscillations at intermediate time regimes in electron transport through a photon cavity

Vidar Gudmundsson[*1], Hallmann Gestsson[1], Nzar Rauf Abdullah[2,3], Chi-Shung Tang[4], Andrei Manolescu[5] and Valeriu Moldoveanu[6]

Abstract

In this work, we theoretically model the time-dependent transport through an asymmetric double quantum dot etched in a two-dimensional wire embedded in a far-infrared (FIR) photon cavity. For the transient and the intermediate time regimes, the current and the average photon number are calculated by solving a Markovian master equation in the dressed-states picture, with the Coulomb interaction also taken into account. We predict that in the presence of a transverse magnetic field the interdot Rabi oscillations appearing in the intermediate and transient regime coexist with slower non-equilibrium fluctuations in the occupation of states for opposite spin orientation. The interdot Rabi oscillation induces charge oscillations across the system and a phase difference between the transient source and drain currents. We point out a difference between the steady-state correlation functions in the Coulomb blocking and the photon-assisted transport regimes.

Introduction

Experimental [1-6] and theoretical [7-11] interest is growing in electron transport through semiconductor systems in photon cavities. The success of circuit quantum electrodynamics (QED) devices with superconducting quantum bits coupled to microwave cavities has pushed for the evolution of hybrid mesoscopic circuits combining nanoconductors and metallic reser-

Influence of lauryl betaine on aqueous solution stability, foamability and foam stability

Asad Hassan Syed[1] · Ahmad Kamal Idris[1] · Dzeti Farhah Mohshim[1] · Nurudeen Yekeen[2] · Muhammad Ali Buriro[3]

Abstract

In gas flooding, one of the major problems in implementing foam as a gas mobility control method is the stability of foam. Foam booster when blended with surfactant could improve the foam stability. However, the influence of foam booster on the conventional foam stability and foamability at elevated temperature and presence of inorganic electrolytes is not yet explicit due to limited studies in this area. The objective of the present work was to evaluate the influence of a foam booster on aqueous solution stability, foamability and foam stability when blended with surfactant at different ratios at an elevated temperature in the presence of brine composed of monovalent and divalent ions. Three different surfactants AOS C_{14-16} (alpha-olefin sulfonate), SDS (sodium dodecyl sulfate) and a locally manufactured surfactant 'Surf X' were chosen as base surfactants. An amphoteric surfactant lauryl betaine was chosen as a foam booster in this study. The aqueous solution stability was visually evaluated, whereas the bulk foam experiments were conducted in a commercial foam analyzer apparatus. It was found that not all solutions were stable when lauryl betaine was blended. Lauryl betaine did not improve the foam generation time. The foam stability was improved; however, not all solutions were able to generate stable foam. 'Surf X' was able to generate more stable foam as compared to AOS and when blended with lauryl betaine it also required less amount of lauryl betaine to generate stable foam.

Keywords Divalent ions · Foamability · Foam stability · Lauryl betaine · Surfactant

Introduction

Foam is a dispersion of gas in a liquid phase such that the liquid is in continuous phase having some of the gas trapped inside the thin liquid films known as lamellae (Hiraski 1989). The surfactant molecules are present at the gas liquid interface, and thereby stabilize the foam films (Katgert 2008; Yekeen et al. 2017a). In gas flooding, the challenge associated with injected gas is poor volumetric sweep efficiency, because of low viscosity and density of gas compared to oil (Memon et al. 2016). Foam has higher apparent viscosity and can control the mobility of the gas by substantially hinder the gas flow in porous media, which forces gas to sweep pores that it would not have reached without foam (Farajzadeh et al. 2012). In short foam divert gas toward zones having lower permeability, it limits viscous fingering and also reduces overriding of gas in high permeability zones of reservoir (Yekeen et al. 2018; Chevallier et al. 2019). There are two main methods by which foam can be generated in porous media, surfactant alternating gas (SAG) and

✉ Asad Hassan Syed
  engr.syedasadhassan@gmail.com

  Ahmad Kamal Idris
  ahmadkamal.idris@utp.edu.my

  Dzeti Farhah Mohshim
  dzetifarhah.mohshim@utp.edu.my

  Nurudeen Yekeen
  peteryekeen@yahoo.com

1 Department of Petroleum Engineering, Faculty of Geoscience and Petroleum Engineering, University Teknologi PETRONAS, 32610 Seri Iskandar, Perak, Malaysia

2 Institute of Hydrocarbon Recovery, Universiti Teknologi PETRONAS, 32610 Bandar Seri Iskandar, Perak, Malaysia

3 Petroleum Engineering Department, Komar University of Science and Technology, Sulaymaniyah, Iraq

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