5th World Congress on

Green Chemistry and Green Engineering

July 19-20, 2018 Melbourne, Australia

Scientific Tracks & Abstracts

Day 1

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Dechun Zou, J Environ Anal Chem 2018, Volume 5
DOI: 10.4172/2380-2391-C1-002

High efficient fiber-shaped perovskite solar cell

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Flexible fiber electronics are booming up in recent years, which are promising candidates for multifunctional e-textiles or smart fabrics. Fiber-shaped solar cells are considered to meet special energy requirements. Planer perovskite solar cells have attracted wide attention with Power Conversion Efficiency (PCE) of 22.1% in recent years. Moreover, perovskite solar cells have a wide range of raw materials are of low cost to fabricate and are all-solution-processed functional films. These characteristics provide a strong foundation for device preparation on fibrous substrates. We firstly integrate the structure of Ti/c-TiO2/meso-TiO2/perovskite/spiro-OMeTAD/Au into the fiber format (Figure-a). The fiber-shaped perovskite solar cells achieved a 5.3% PCE under AM 1.5 illumination and an apparent 8.4% efficiency in the diffuse model. The device design required no transparent conductive oxides and all the processes for device fabrication were easy to handle and energy-saving. The fiber devices exhibited high reproducibility. Based on the former research, we adopted electrical heating assisted multiple coating method to precisely control perovskite coverage and thickness, which solves the challenges by continuous deposition and hot coating technique. Continuous deposition feature allows improving film coverage and controlling thickness by simply changing the number of coating times. In addition, electrical heating is applied to accelerate film formation and perovskite transformation. A fully covered thin film of perovskite is obtained and the corresponding devices achieve a high average PCE of 6.58% with a narrow standard deviation of 0.558. We further introduce lead acetate as the lead source to improve the perovskite film morphology (Figure-c). A large grain size and uniform perovskite film could be obtained via a simple dip-coating process (Figure-b). The fiber-shaped perovskite solar cells achieved a PCE of 7.53% and VOC of 0.96 V under AM 1.5 illuminations (Figure-c). With further materials optimization and interface engineering, fiber-shaped perovskite solar cell could be practical unites for efficient flexible/wearable energy systems and bring new fascinations for portable fiber electronics.

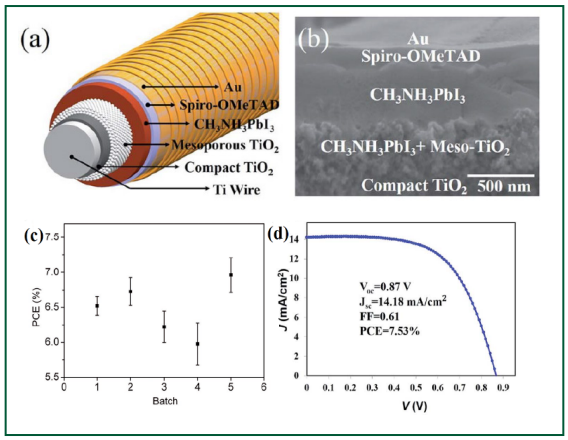

figure-1: (a) schematic; (b) cross-sectional sem image of the fiber-shaped perovskite solar cells based on the lead acetate precursor; (c) reproduction of the highest pce of devices prepared by electrical heating assisted multiple coating method for five batches. each value is the average pce of a batch. error bar is sd; (d) j-v curve of the best-performing fiber-shaped perovskite solar cells based on the lead acetate precursor

Recent Publications

1. Hu Hsienwei, Dechun Zou, et al. (2016) Fiber-shaped perovskite solar cells with 5.3% efficiency. *Journal of Materials Chemistry A*; 4(10): 3901- 3906.
2. Cai Xin, Deuchun Zou, et al. (2014) Flexible planar/fiber-architectured supercapacitors for wearable energy storage. *Journal of Materials Chemistry C*; 2(7): 1184-1200.

Biography

Dechun Zou has completed his BSc from Northwestern Protechnical University and PhD degrees from Kyushu University. He went to Mitsubishi Chemical Corporation as Postdoctoral Fellow. He has worked as Researcher at Tokyo University of Agriculture and Industry, Casio Computer, CREST/JST (Japan Science and Technology Corporation), etc. He went back to China and joined Peking University as a full Professor in College of Chemistry and Molecular Engineering. His field of expertise includes dye sensitized solar cells, hybrid organic-inorganic perovskite based solar cells, flexible/wearable integrated power fiber, memristors and ight-emitting diodes, etc.

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Jibran Iqbal et al., J Environ Anal Chem 2018, Volume 5
DOI: 10.4172/2380-2391-C1-002

Fabrication and characterization of biopolymer-based composite beads for effective removal of heavy metal ions from waste waters

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Recently, attention has been drawn to the use of bio-reinforced composites in many fields due to increased concern for environmental sustainability. This study was conducted to assess the adsorption efficiency of polymer-based composite beads for removal of Cu and Ni from waste water. For this purpose, cellulose, sodium alginate and Hydroxy Apatite (HA) beads were synthesized. The materials used have environmental importance and are widely covered in green chemistry. A factorial design approach was conducted to establish the optimum conditions for the adsorption of heavy metals ions. The developed beads were characterized using Fourier Transform Infrared spectroscopy (FTIR), X-Ray powder Diffraction (XRD), Scanning Electron Microscopy (SEM) and Thermogravimetric Analysis (TGA). Presence of characteristic functional groups, surface morphology, thermal stability and percentage increase of cellulose was evidenced by these characterization tests. The effect of various experimental parameters on adsorption such as contact time, pH, initial metal concentration and adsorbent dose was studied during removal process. The adsorption process was fast with adsorption equilibrium achieved at 20 minutes for Cu and 30 minutes for Ni. It was found that the experimental data is best fitted with Langmuir isotherm model. The kinetic studies revealed that it follows pseudo second order kinetics. Increase in percentage cellulose caused increase in adsorption capacity. Maximum adsorption capacity for Cu and Ni was found to be 39.71 mg/g and 41.95 mg/g on beads with 60% cellulose.

Recent Publications

1. Khalid B, Rahim A, Muhammad N, Tabassum S and Iqbal J (2018) *In situ* immobilization of CuO on SiO2/graphite matrix, modified with benzimidazolium-1-acatate ionic liquid: Application as catechol sensor. *Journal of Molecular Liquids*; 251: 450-457.
2. Iqbal J, Du Y, Howari F, Bataineh M and Muhammed N (2017) Simultaneous enrichment and on-line detection of low-concentration copper, cobalt and nickel ions in water by near-infrared diffuse reflectance spectroscopy combined with chemometrics. *Journal of AOAC International*; 100(2): 560-565.

Biography

Jibran Iqbal works as an associate professor at Zayed University. Jibran Iqbal's research is mainly focused on analytical chemistry and environmental chemistry. His recent and ongoing research has been primarily focused in the areas of low cost and sustainable water and wastewater treatment. The aim of his research is to develop state-of-the-art knowledge, tools and processes to advance the field of water purification and disinfection technologies to address the new challenges in the field of water treatment technologies through contributions to the areas of new materials/trace analysis method development.

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Geethu Kurup et al., J Environ Anal Chem 2018, Volume 5
DOI: 10.4172/2380-2391-C1-002

Recovery of value adding organic components from dairy wastewater using food grade low-cost organic lignosulphonate

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The dairy sector is one of Australia's largest agricultural industries with an annual milk production of 9.02 billion liters. It is also one of the largest effluent producing industries and poses considerable challenges in environmental waste management due to high Biological Oxygen Demand (BOD). The objective of this research is to use a low-cost food grade organic polymer to recover value adding components including milk proteins and dairy fats to reduce the high BOD in acidic dairy effluent. The sodium salt of lignosulphonate is a low-cost organic by-product from the wood pulping industry and this polymer has industrial applications as a pellet binder in cattle feed stock and in egg and meat waste management. This anionic polymer has potential application in dairy waste treatment by binding positively charged proteins in acidic conditions forming complexes which are easily recovered by sedimentation. The polymer also can trap fat molecules which are insoluble in acidic condition and conglomerate with the protein-lignosulphonate complex. At an optimum concentration of 0.016% addition and at pH 3.5, Na-lignosulphonate reduces the turbidity of dairy wastewater by 98% at both ambient temperature (22±2 °C) and 40 °C. There is a significant reduction ($p<0.05$) in biological oxygen demand by 73.75% at 22 °C and 70% at 40 °C. This is due to the removal of organic components including proteins (46%) and fats (96%) from the dairy waste stream. SDS-PAGE analysis reveals that out of the 46% total protein recovered, 90% was caseins and 10% whey proteins. The remaining 54% of the total soluble proteins were predominantly whey protein. The recovered organic complexes rich in dairy protein and fat have potential value adding uses in subsequent feed stock manufacture.

Biography

Geethu Kurup is currently pursuing her PhD in water treatment from School of Science, RMIT University, Australia. She has completed her Master's degree in Chemical Engineering. Presently, she is undertaking research to develop a sustainable approach to reduce the environmental impact of dairy sector.

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Notes:

Mozhdeh Seyyedhamzeh et al., J Environ Anal Chem 2018, Volume 5
DOI: 10.4172/2380-2391-C1-002

Preparation of cellulose modified with metallophthalocyanines as a new biocompatible catalytic system

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Heterogenized catalysts containing biocompatible supports green aspect of the procedure. Using cellulose as a support in the different catalytic reactions showed high activity of cellulose supported catalysts. Nowadays, many efforts have been accomplished on the improvement of efficient catalytic methods using Metallophthalocyanines (MPcs) as attractive oxidation catalysts. MPcs shows high activity, rather facile preparation in a large scale and chemical and thermal stability. In the present work, MPcs was immobilized on Microcrystalline Cellulose (MCC). The prepared nanocomposite revealed good catalytic activity for the oxidation of alcohols, ethylbenzene and styrene with high conversions. Furthermore, good selectivities have been observed during oxidation of alcohols to the corresponding aldehydes or ketones and also oxidation of ethylbenzene and styrene to acetophenone.

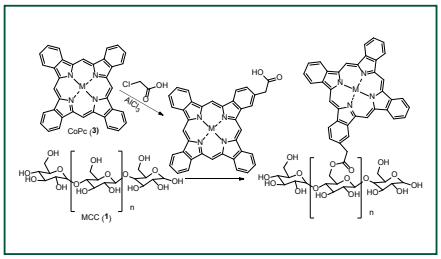

Figure-1: *Preparation of catalyst.*

References

1. Keshipour S and Adak K (2017) Magnetic d-penicillamine-functionalized cellulose as a new heterogeneous support for cobalt(II) in green oxidation of ethylbenzene to acetophenone. *Applied Organometallic Chemistry*; DOI: 10.1002/aoc.3774.
2. Keshipour S and Khezerloo M (2017) Gold nanoparticles supported on cellulose aerogel as a new efficient catalyst for epoxidation of styrene. *Journal of the Iranian Chemical Society*; 14:1107-1112.

Biography

Mozhdeh Seyyedhamzeh has obtained her PhD and focused on the synthesis of organic molecules and exploring fundamental chemical principles to aid the development of efficient synthetic methods. During her Postdoctoral research, she was interested in nano-catalysts and nano-technologies for green organic synthesis by using nanomaterials such as carbon nanotubes and grapheme. She is also interested in synthesis of nano-biocompatible catalysts which is based on cellulose.

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Shweta Sareen et al., J Environ Anal Chem 2018, Volume 5
DOI: 10.4172/2380-2391-C1-002

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A review on ecofriendly syntheses of mesoporous silica from biomass and fly-ash

Shweta Sareen, Vishal Mutreja and S K Mehta
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Mesoporous silica materials have always represented an exceptional dominance in the field of material synthesis owing to the exploitation of their superior surface properties. Consequently, they have earned wider applicability in various fields ranging from catalysis, adsorption, sensors, nano-casting, chromatography and medicine. Different approaches have been developed to synthesize mesostructured silica materials using chemical sources like silicon alkoxide (silicon tetraethoxysilane) as the typical silicon source and expensive structure directing agents. However, in response to the growing environment concern, sustainability issues associated with the silica precursors, harsh synthetic conditions and high cost of its production limit their manufacture is at industrial scale. Moreover, the structuring agents (surfactants) used in the synthesis process, being non-biodegradable are generally lost during the last step of mesoporous silica synthesis. So, there has been an emergent need to develop more environment-friendly and sustainable procedures for synthesizing mesoporous silica nanostructures. Keeping in view the credentials of green chemistry, nowadays Ordered Mesoporous Silica (OMS) materials have been synthesized from the biomass comprising the agricultural wastes like rice straw, corn cob and bagasse and industrial wastes like coal fly ash used as the silica source and surfactants derived from renewable sources. It not only makes the entire synthesis process cost-effective which is the emergent need of material synthesis but caters to deal with the problem of waste disposal associated with the coal power plants. Since the synthesized silica materials are expected to be efficient adsorbents so they can be effectively utilized for the treatment of waste water discharged into the environment as industrial waste that contains toxic organic and inorganic chemicals and causes serious soil and water pollution. In this regard, a comprehensive review based on recent advances on the greener and sustainable synthesis of mesoporous silica nanostructures and employing their use for various industrial applications will be presented.

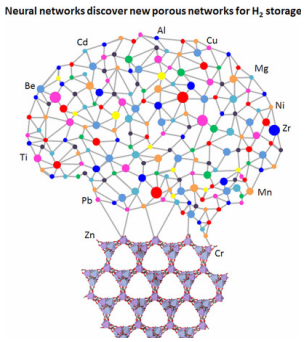

Figure-1: Ecofriendly synthesis.

Recent Publications

1. Sareen S, Mutreja V, Pal B and Singh S (2017) Synthesis of bimetallic Au-Ag alloyed mesocomposites and their catalytic activity for the reduction of nitroaromatics. *Applied Surface Science*; 435: 552-562.
2. Sareen S, Mutreja V, Singh S and Pal B (2016) Fine CuO anisotropic nanoparticles supported on mesoporous SBA-15 for selective hydrogenation of nitroaromatics. *Journal of Colloid and Interface Science*; 461: 203- 210.

Biography

Shweta Sareen has her expertise in the designing and synthesis of mesoporous silica-based nanomaterials. She has developed a strong knowledge in the fabrication of morphologically and dimensionally controlled anisotropic metal nanoparticles viz., nanorods, nanowires and nanotubes of coinage metals and investigation of the relation between their various physicochemical and catalytic properties. She has a good exposure of various characterization and analytical techniques. Presently, she is working as a Post Doc Fellow under the National Post Doc Fellowship Scheme awarded by the Science and Engineering Research Board.

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Fangrui Zhong et al., J Environ Anal Chem 2018, Volume 5
DOI: 10.4172/2380-2391-C1-002

Rhodium-catalyzed intermolecular C (sp3)-H amination in a purely aqueous system

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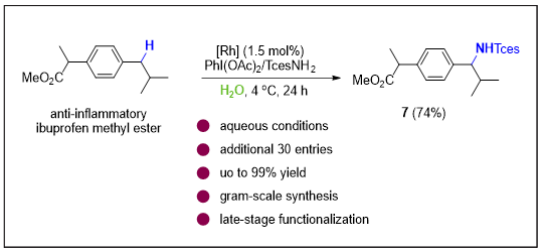

In recent years the synthetic community has been experiencing an increasing pressure and motivation on the way to improve the environmental benignity of chemical processes. However, despite considerable advances there remains a significant challenge for synthetic systems to perform transformations that nature can routinely achieve at physiological conditions. Considering the green nature of water, the aqueous medium adopted in enzymatic processes is of immense interest to the synthetic community. However, reactions mediated by synthetic catalysts, even for most prominent transition metal complexes that have revolutionized industrial organic synthesis are still primarily restricted to organic solvents and have met with limited success when used in water. Aliphatic amines represent a category of compounds particularly favored by nature as validated by the wide occurrence of diverse biologically active alkaloids. Conventional approaches mainly rely on the inherent reactivity of functional groups such as alcohol and carbonyl, the direct C-H amination via transition metal catalyzed nitrene transfer provides a novel and straight forward synthetic strategy. Given the high electrophilicity of metal nitrenoid intermediates, such amination processes are normally performed in inert solvents not bearing C (sp^3)-H bonds (e.g. benzene, dichloromethane). In this context, we have successfully developed the first metal catalyzed intermolecular C (sp^3)-H amination reactions performed in a purely aqueous medium under mild conditions. The method features great environmental benignity and high efficiency towards a wide range of hydrocarbons bearing different functional groups. Its versatile synthetic utility has been demonstrated by late stage functionalization of several bioactive molecules and thus we anticipate the methodology described here will find wide applications in sustainable chemistry of catalytic C-H functionalization.

Recent Publications

1. X Lu, Y Shi and F Zhong (2018) Rhodium-catalyzed intermolecular C (sp3)-H amination in a purely aqueous system. *Green Chemistry*; 20: 113.
2. T Wang, X Han, F Zhong, W Yao and Y Lu (2016) Amino acid-derived bifunctional phosphines for enantioselective transformations. *Accounts of Chemical Research*; 49(7): 1369-78

Biography

Fangrui Zhong has obtained his BSc from Zhejiang University followed by his PhD. He had joined the Faculty of Huazhong University of Science and Technology as a Professor of Chemistry. He has received several awards including Thieme Chemistry Journal Award; Singapore National Institute of Chemistry Gold Medal; Wang Gungwu Medal and Prize and finalist of Reaxys PhD prize. His research involves the development of novel and efficient sustainable synthetic methods inspired by nature.

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Notes:

Ana Sofia Figueroa Infante, J Environ Anal Chem 2018, Volume 5
DOI: 10.4172/2380-2391-C1-002

Chemical change of the asphalt properties by water effect

Ana Sofia Figueroa Infante
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This research studies the effect of water on the AC 80-100 asphalt. The bitumen was evaluated under the action of water and its rheology was assessed through tests with the dynamic shear rheometer. Physical performance was evaluated by conventional empirical tests that included penetration, softening point, ductility and viscosity. The chemical tests were evaluated on liquid chromatography (fractionation SARA) and infrared spectroscopy. The results showed that water has a significant influence on the physical, visco-elastic and chemical properties of asphalt. Rheological properties showed a sinusoidal value of |G*| also changes the asphalt δ angle exposed to water. Chemical properties showed important changes in the activation energy of asphalt and consequently emerged some functional groups that are evidence of asphalt aging such as sulfoxides and carboxiles.

Recent Publications

1. Figueroa Infante A S and Reyes Lizcano F A (2015) Moisture damage analysis for an asphalt mixture through the mist test and the IPAS 2D(r) software. *Infraestructura Vial*; 17(30): 31-39.
2. Infante A S F and Santanilla E F (2015) Estudio de material reciclado para reparar fisuras y su aplicación en un pavimento en Bogotá. *Epsilon*; (24): 89-121.

Biography

Ana Sofia Figueroa Infante has her expertise in evaluation of materials and different process for improving its behavior in asphalt mixtures that are essential in flexible pavements. Her research is based on recycling materials reuse and the analysis of environmental effects on pavements, such as water, moisture and others to choose some environmentally friendly and technical solutions based on lower costs.

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Jixiang Guo et al., J Environ Anal Chem 2018, Volume 5
DOI: 10.4172/2380-2391-C1-002

Heavy oil-water two-phase flow characteristics in a vertical pipe

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Oil-water two-phase flow widely exists in the oil industry with environment of high temperature and high pressure, such as oil exploitation, transportation and refining. Despite the great progress about oil-water two-phase flow, it seems clear that there is room for a great deal for more research on the effect of temperature and pressure on heavy oil-water two-phase vertical flow pattern. The goal of this study is to promote a better understanding of flow patterns of heavy oil-water two-phase pipe flow, particularly, flow patterns under high temperatures and high pressures. We conducted experimental measurements to examine the upward oil-water flow patterns in a small diameter vertical pipe (0.01 m ID) under high temperatures up to 130 °C and high pressures up to 20 mPa. The viscosity of the oil sample was 584.24 mPa-s and the density were 1.899 g/cm^3 at 30 °C. All the experiments were conducted with an in-house-built high pressure/temperature flow apparatus. This apparatus is equipped with a view window that allows us to visually observe the upward flow patterns of oil-water two-phase flow in a 0.01 m ID stainless steel pipe. The effects of pressure, temperature, Input Water Fraction (IWF) and mixture flow velocity on the flow patterns were systematically investigated. We plot the observed flow patterns on a flow pattern map in which input water fraction was used as the Y-axis and the mixture flow velocity was used as the X-axis. Based on the measurement results, we can observe the following flow patterns water-in-oil dispersed flow (D w/o), water-in-oil Bubbly flow (B w/o), water-in-oil Slug flow (S w/o), water-in-oil Creep Flow (CE w/o), churn flow (churn) and core Annual Flow (AF). Phase inversion was not observed in this work. With an increase in temperature at a given input water fraction, S w/o, CE w/o and churn flow with large water drops tended to transform into B w/o and D w/o with smaller water drops, the CE w/o disappears gradually, and the boundaries in the flow pattern maps tend to occur at lower input water fraction values. The effect of pressure on the flow patterns was found to be opposite to that of temperature. The possible causes leading to the changes in the flow patterns subjected to pressure/temperature variations were provided in terms of changes in density ratio, interfacial tension and viscosity ratio between oil and water.

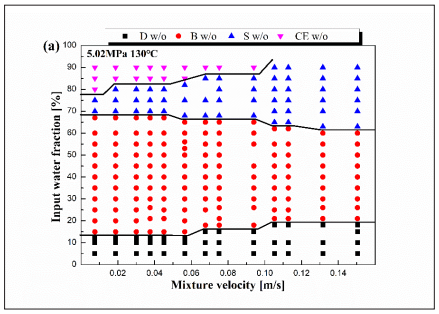

Figure-1: *Flow pattern map based on input water fraction and mixture velocity under 5.02 mPa at 130 °C.*

Biography

Jixiang Guo has completed her Doctor degree of Chemistry Engineering and Technology from China University of Petroleum, Beijing. She is a Professor and Doctoral Supervisor major in enhancing oil recovery. She has presided over several China's major scientific research projects. She has published more than 40 papers in reputed journals and has been serving as an Editorial Board Member.

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Scientific Tracks & Abstracts

Day 2

Marcin Smiglak et al, J Environ Anal Chem 2018, Volume 5
DOI: 10.4172/2380-2391-C1-002

Helping plants to become healthier

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[1]Poznan Science and Technology Park Adam Mickiewicz University Foundation, Poland
[2]National Research Institute, Poland

Modern agriculture at present times is facing many challenges. On one hand, society requires crops and plant-related products free of contaminations from Plant Protection Products (PPP) residues; on the other hand, crop quantity and quality should be sufficient to support continuously increasing demand for food. Unfortunately, most often crop yields are reduced by pathogens, insects, other pests or weather conditions, so that forces modern agriculture to focus on finding new and more sophisticated methods of plant protection, even not chemical-based. Systemic Acquired Resistance (SAR) is a phenomenon involving stimulation of natural plant immune system which acts to increase resistance against pathogens, especially viruses (which cannot be controlled via classical plant protection agents). SAR could be induced by biological (pathogens) or chemical agents. One of them is BTH (Benzo-(1,2,3)-thiadiazole-7-carbothioic acid S-methyl ester) discovered in the last decade of 20th century. Unfortunately, usage of this compound was very limited due to its very low solubility in water (~7 mg/L). It was interesting to us to design new ionic derivatives of BTH that could be combined with other functional counterions leading to formation of highly water soluble bifunctional salt. As a result, we have prepared new group of bifunctional salts (including ionic liquids) with SAR inducer ion combined with biocidal agent or water solubility modifier. On the other hand, research on BTH-based compounds showed that not only salts exhibit very high potential in SAR induction but also neutral synthesized carboxylic acid derivatives such as amides or esters have also very high biological potential. Some of the obtained compounds exhibit very high biological activity (up to >99% of infection inhibition) at tested doses (even as low as 20 mg/L). In our opinion such new compounds could be in future successfully used as a new plant protection product.

Figure-1: Antibacterial effect of bthwa; control (left); treated plant (right). Model plant: tomato; bacteria Psuedomonas syringae pv. tomato

Figure-2: Antifungal effect of bthwa; control (right); bthwa treated plant (left). Model plant tomato; fungi: powdery mildew.

Recent Publications

1. Smiglak M, Lewandowski P, Kukawka R, Budziszewska M, Krawczyk K, Obrepalska-Steplowska A and Pospieszny H (2017) Dual functional salts of benzo[1.2.3]thiadiazole-7carboxylates as a highly efficient, eco-friendly weapon, against viral plant diseases. *ACS Sustainable Chemistry and Engineering*; 5(5): 4197- 4204.
2. Stolarska O, Pawlowska-Zygarowicz A, Soto A, Rodríguez H and Smiglak M (2017) Mixtures of ionic liquids as more efficient media for cellulose dissolution. *Carbohydrate Polymers*; 178: 277-285.

Biography

Marcin Smiglak has obtained his MSc Engineering in Technology of Organic Chemistry from Poznan University of Technology. He has completed his PhD in Organic Chemistry from The University of Alabama, USA. He held a position of Post-doctoral Research Associate in Prof. Robin D Rogers's research group at Center for Green Manufacturing and Alabama Institute of Manufacturing Excellence, The University of Alabama, USA. Further, he took a position of Head of Production and Technology R&D in IoLiTec Ionic Liquid Technologies GmbH, Heilbronn, Germany. He hold a position of Head of Materials Synthesis Group at Poznan Science and Technology Park, Poznan, Poland and leads research group oriented toward research on applications of ionic liquids.

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De Xia, J Environ Anal Chem 2018, Volume 5
DOI: 10.4172/2380-2391-C1-002

Evaluation framework of barriers during green technology adoption

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Adoption of an appropriate green technical solution matching with the enterprise operational characteristics is not only essential for its green sustainable ambitious, but also a key process in the successful commercialization of technical achievements on the micro level. The fundamental challenge is to recognize the possible barriers in the process of green technology adoption and transformation and make a comprehensive evaluation and clarify the supporting resources and environment required to overcome these obstacles. The work is the very basis of a rational decision-making, which plagues practitioners for a long period. This paper intends to build a barrier identification and examination system in the process of green technology adoption. The goal of this work is to establish a comprehensive identification framework and index system for green technology adoption. The structure is consisted of two dimensions of competence and motivation driven from the previous research related with organization operation theory and organizational psychology theory. Thereafter operational recognition indicators are explored and set with the perspective of extended life cycle theory which may be confronted in green technology adoption. According to the nature and logic of recognition system purposed trapezoidal fuzzy evaluation is applied into the identification system and the practical computation steps are designed for the application. Meanwhile a numerical example demonstrates the application of the recognition system clarifying the utilization of diagnosis. This research can support the decision-making process for practitioners in green technology adoption. It may narrow the gap between sustainable strategy and green operation in practice while enriching green technology innovation and sustainable operation theory.

Recent Publications

1. Xia D, Yu Q, Gao Q, et al. (2017) Sustainable technology selection decision-making model for enterprise in supply chain: Based on a modified strategic balanced scorecard. *Journal of Cleaner Production*; 141: 1337- 1348.
2. Xia D, Chen B and Zheng Z (2015) Relationships among circumstance pressure, green technology selection and firm performance. *Journal of Cleaner Production*; 106: 487-496.

Biography

De Xia has his expertise in green operation management in improving sustainability. He has obtained his MSc and PhD degrees in Management Science and Engineering, both from Wuhan University of Technology, China. Currently, he is a Full Professor of Management School at Wuhan University of Technology and was a Visiting Researcher in Warwick Business School of Warwick University, UK. His current research interests are green technology adoption, green supply chain management, fuzzy decision making. He is the Principal Investigator of National Nature Science Foundation of China and National Social Science Foundation of China and Collaborator of Key Program of National Social Science Foundation of China. He has published more than 50 papers in journals, conference as well as 2 books related to his areas.

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Wei-Qi Huang et al., J Environ Anal Chem 2018, Volume 5
DOI: 10.4172/2380-2391-C1-002

Si solar cells with higher efficiency for picking up photons in ultraviolet and infrared region of solar spectra

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[2]Fudan University, China

Surface-induced effects on micro nano-pattern and quantum confinement effect in Si nanostructures offer interesting features that could be used to boost the efficiency of photovoltaic energy conversion and to overcome some of the restraints that lead to the Shockley–Queisser limit. Micro nano-structuring has been suggested as a promising method to find a new path to get an effective absorber for solar cells with higher efficiency in a photovoltaic system. Recently, significant effort has been focused on enhancing the light absorption by nano-scale light trapping using nanowires, nano-cones, nano-domes and nano-holes. Despite the exciting success in light trapping, the power conversion efficiency of nano-structured Si solar cells, however, remain lower efficiency for the thick devices and the thin devices. The Si solar cells with nanostructures are not efficient because of severe Auger recombination. In addition it is also needed for Si solar cells with higher efficiency to pick up photons in ultraviolet and infrared region of solar spectra. Here, we have found the new methods in which the localized electronic states with longer lifetime due to the Heisenberg principle related to $\Delta t \sim h/\Delta E$ are built from the impurities on the nanostructures for avoiding severe Auger recombination, which involve the electronic states due to impurities built on the smaller nanostructures doped with oxygen and the electronic states owing to impurities built on the defects doped with oxygen for improving photovoltaic conversion in ultraviolet and infrared regions.

Biography

Wei-Qi Huang is the Professor and Director of the Center for Green Chemistry at UMass Boston. He was Winner of 2015 International Fluorous Technology Award.

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Notes:

De Xia, J Environ Anal Chem 2018, Volume 5
DOI: 10.4172/2380-2391-C1-002

Research on sustainable technology selection decision making model for enterprise

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During technology adoption, assessment of its sustainable character it is difficult task to limit the insight and dimensions of sustainability, as well as its complicated application at the operational level. A proper decision-making framework and method may be conducive to bridging generic and macro-level sustainability with local-site and task-oriented technology selection, improving the application of sustainable technology. For this reason, a framework is explored to highlight the sustainable nature of relevant components during an operational decision-making process within the supply chain. With an eye to the triple bottom of sustainability, the product chain, value-added activities of supply chain and stakeholders are analyzed and embedded into the technology selection method. The dynamic relationships among these components (product chain, value-added activities and stakeholders) as carriers of the technology are also discussed to investigate their sustainable features. Furthermore, to figure out the whole technology decision making logic map, a modified strategic balanced score card is established and applied to evaluate technology candidates in terms of their features of sustainability. Next, a computing method is designed to produce a sustainable technology choice. The multilateral mechanisms among the three groups, as well as within each group, during the technology selection process are identified and elaborated completely. The framework of analysis and method presented in the paper add insight to sustainability theoretically and guide its application in technology adoption. Managerial implications as well as limitations of this work conclude this paper.

Recent Publications

1. Xia D, Chen B, Zheng Z (2015) Relationships among circumstance pressure, green technology selection and firm performance. *Journal of Cleaner Production*; 106: 487-496.

Biography

De Xia has his expertise in Green Operation Management in Improving Sustainability. He has obtained his MSc and PhD degrees in Management Science and Engineering, both from Wuhan University of Technology, China. Currently, he is a Full Professor of Management School at Wuhan University of Technology and was a Visiting Researcher in Warwick Business School of Warwick University, UK. His current research interests are green technology adoption, green supply chain management, fuzzy decision making. He is Principal Investigator of National Nature Science Foundation of China and National Social Science Foundation of China and Collaborator of key program of National Social Science Foundation of China. He has published more than 50 papers in journals, conference as well as 2 books related to his areas.

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