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Abstracts

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ROBUST PHOSPHATE CAPTURE OVER ADSORBENTS DERIVED FROM LANTHANUM METAL ORGANIC FRAMEWORKS

Xintong Zhang, Fuyi Cui and Wei Wang
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Excessive phosphate in water can cause severe water quality problems owing to its somatotrophic effect on microorganisms. Herein, a superstructural phosphate scavenger, La-MOF-500, composed of $La_2O_2CO_3$ is rationally designed by derivation from lanthanum metal organic frameworks (La(1, 3, 5-BTC) $(H_2O)_6$) by calcination. La-MOF-500 has a hierarchical micro/nano structure of microsphere-nanorod-nanoparticle: urchin-like microsphere is comprised of many nanorods and the individual nanorod was formed by piling up plentiful thin nanoparticles. The hierarchical micro/nano structure provides La-MOF-500 with an intriguing phosphate capture capacity of 173.8 mg P/g and a high utilization of lanthanum active sites, simultaneously, which was a challenge in previous research. Moreover, La-MOF-500 exhibits a good tolerance of foreign tolerance of foreign species. Even in the water from Songhua River, China, La-MOF-500 can remove phosphate to be less than 10 µg P/L. This development is expected to be meaningful for practical water purification.

Biography

Xintong Zhang is pursuing her PhD at School of Municipal and Environmental Engineering in Harbin Institute of Technology. She specializes in Water-Treatment. She is working on nutrient-starvation antibacterial and fabrication of corresponding adsorbent that can capture phosphate and organic matter in water, synchronously. She has published two papers in *Journal of Materials Chemistry A* and *Chemical Engineering Journal* respectively.

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INFLUENCE OF ALGAE GROWTH PHASE ON THE FORMATION OF DISINFECTION BY PRODUCTS FROM CHLORINATION OF MICROCYSTIS AERUGINOSA: IMPACT AND MECHANISM

Rui Huang, Zhiquan Liu, Boyin Yan, Peng Wang and **Fuyi Cui**

Harbin Institute of Technology, China

It is well known that algae and their metabolites may form disinfection by-product during chlorine disinfection process, but the quantitative relationship between algae and disinfection by-products formation potential (DBPFP) is rarely reported. In the present study, the intracellular and the extracellular metabolites from *Microcystis aeruginosa* in different growth phases were harvested and separated into hydrophilic and hydrophobic groups, and the variations of DBPFP in different groups were investigated. The results show that although the cell density of *M. aeruginosa* in decline phase was only one sixth of that in stable phase, the total DBPFP in the two growth phases were comparable. This implied that the average DBPFP in specific cell of decline phase is much higher than that of stable phase. The increased DBPFP in intracellular organic matter (IOM) of decline phase could be attributed to the increase of hydrophilic organic in IOM while the increased DBPFP in extracellular organic matter (EOM) is mainly caused by the increase of hydrophobic organic in EOM. The obtained results indicated that DBPFP could change with the algal growth phases and the actual disinfection risk cannot be simply evaluated by cell density in water, and the algal laden water in autumn, the end of algal bloom season may even danger to be disinfected than that in summer.

Biography

Rui Huang has completed his Master's degree from Harbin Institute of Technology (HIT). Currently, he is a Doctoral student in HIT, majoring in Environmental Science and Engineering. His research interest is microalgae in aquatic environment and the disinfection by-products caused by microalgae. In his three years of academic career, he has published three papers in reputed journals.

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ELECTROCHEMICAL–CATALYTIC REDUCTION OF NITRATE OVER PD–CU/γAL$_2$O$_3$ CATALYST IN CATHODE CHAMBER: ENHANCED REMOVAL EFFICIENCY AND N$_2$ SELECTIVITY

Zhiqiang Zhang, Wenxin Shi and Fuyi Cui

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The Pd–Cu/γAl$_2$O$_3$ catalysts were prepared by impregnation method and introduced into the cathode chamber of a divided electrochemical denitrification cell with two graphite plates as the cathode and anode, to enhance the nitrate removal efficiency and N$_2$ selectivity. The Pd–Cu/γAl$_2$O$_3$ catalysts were characterized by transmission electron microscope (TEM), x–ray diffraction (XRD), specific surface area measurements using BET and inductively coupled plasma–atomic emission spectrometry (ICP–AES). In the rationally designed electrochemical–catalytic (ECC) system, the as–prepared catalyst could significantly enhance the nitrate degradation rate to 1.08 mg/L at current density of 10 mA/cm², which was approximately 2.5 times compared with the electrochemical (EC) system without catalysts adding in. Additionally, a higher nitrogen selectivity of 80.37% was obtained under the same experiment condition. The improved performances were likely due to the presence of a catalytic reduction reaction of nitrate with the appropriate amount of hydrogen generated by electrolysis as reductant. Significantly, the current efficiency was calculated and enhanced value of 20% to 40% (depended on current density) was obtained in the ECC process with a catalyst content of 1.0 g/L.

Biography

Zhiqiang Zhang is a PhD student from School of Municipal and Environmental Engineering, Harbin Institute of Technology. His research direction is novel catalyst development and application in the field of environmental science and technology, especially in the removal of oxyanion, such as nitrate, perchlorate and bromate from water by catalytic hydrogenation reduction method using Pd- or Pt-based catalyst.

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FACILE SYNTHESIS OF Fe$_3$O$_4$@C BASED ON IRON SLUDGE AS HETEROGENEOUS PERSULFATE CATALYST FOR DEGRADATION OF ORGANIC CONTAMINANTS

Shijun Zhu, Yongpeng Xu and **Fuyi Cui**
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Iron salts (e.g., FeCl$_3$, FeSO$_4$.7H$_2$O and PFCl) have been used widely as coagulant in drinking water treatment plant for removal of turbidity, color and natural organic matters. Simultaneously, large amounts of iron rich sludge are produced by drinking water treatment plants worldwide. Considering the high iron (ferric hydroxide) concentration in sludge, it could be beneficially reused as iron source with tremendous potential to prepare ferric oxide for catalysis of oxidation process. Persulfate [e.g. peroxydisulfate (PDS) and peroxymonosulfate (PMS)] has been increasingly recognized as a viable, alternative oxidation process for *in situ* chemical oxidation (ISCO), groundwater/soil remediation. Herein, we experimentally investigate the feasibility of reusing amorphous iron sludge to prepare Fe$_3$O$_4$@C magnetic particles (MPs), seen from characterization of XRD and FT-IR, through a facile solvothermal and pyrolysis method. Morphologic monitoring with a scanning electron microscope (SEM-EDS) revealed that during the solvothermal and pyrolysis process as-prepared Fe$_3$O$_4$@C aggregated to form surface of irregularly shaped particles with fine grains and displayed porous structure. The major chemical element components of Fe$_3$O$_4$@C contain C (24±0.2%), O (41.1%), Si (7.3±1.1%) and Fe (22±2.5%). These as-prepared sludge-derived particles are considered as an efficient heterogeneous catalyst for the activation of persulfates. More than 99% of methylene blue (MeB) was degraded within 15 min at 0.5 g/L PDS and 0.2 g/L Fe$_3$O$_4$@C, which was more efficient than PMS under the same condition. This study provides alternative iron sludge recycle method of converting water treatment residuals to the cost efficient catalysts for degradation of azo-dye and refractory organic contaminants.

Biography

Shijun Zhu is a Doctoral candidate in School of Municipal and Environmental Engineering, Harbin Institute of Technology (HIT), China. He has completed his Master's degree from HIT. His major is Environmental Engineering and his research focuses of environmental chemistry and materials, the development of sustainable water recovery and reuse, advanced catalytic oxidation of persistent organic contaminants in water and wastewater. He has published more than four papers as first author or corresponding author in domestic and foreign journals and has been invited by international journals as a Reviewer. In the past few years, he has continuously reviewed for international top-ranked journals like *Journal of Hazardous Materials, Frontiers of Environmental Science and Technology, Water Environment Research.*

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GRAVITY DRIVEN ULTRAFAST REMOVAL OF ORGANIC CONTAMINANTS ACROSS CATALYTIC SUPERWETTING MEMBRANE

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Herein, flexible, magnetic and hierarchical porous catalytic carbon nanofibrous membranes (MnO/Co@SiO$_2$-CNFMs) driven by gravity were prepared by co-electrospinning technique and self-reduced pyrolysis. Benefiting from the active metals and precursor carrier design, the composite active MnO/Co crystals can be directly produced without any reducing gases and easily migrate to carbon nanofiber surface during the carbonization process. Meanwhile, the silica nanoparticles (SiO$_2$ NPs) doped in carbon nanofibers (CNFs) can maintain the carbon nanofiber structure without obvious shrinkage as well as transmit and scatter the outer stress, which endowed the membrane with robust flexibility. The as-prepared MnO/Co@SiO$_2$-CNFM exhibited a superhydrophilic surface with a water contact angle of 0°, fast water flux of 752±28 L/m^2·h, prominent catalytic performance with a high degradation efficiency over 99.5% toward methylene blue (MeB). Most importantly, the amount of wastewater treated by gravity driven catalytic membrane was about four times the static degradation without external driven force. Furthermore, four typical refractory pollutants (phenol, bisphenol-S, chlorophenol and sulfaethoxazole) also can be efficiently degraded by gravity driven MnO/Co@SiO$_2$-CNFMs/PMS system. This study is meaningful for the development of novel catalytic membrane with high efficiency and low energy consumption for wastewater treatment.

Biography

Zhigao Zhu is a Doctoral candidate of School of Environmental from Harbin Institute of Technology (HIT), China. He has completed his Master's degree from Donghua University (DHU), China. His major is Environmental Engineering and his research focuses of selectivity wettable porous membranes for various applications such as oil-water separation, membrane distillation, waterproof & breathable fabric membrane, filtration catalytic oxidation of persistent organic contaminants in water and wastewater. Until now, he has published nine papers as first or co-first author in reputed journals like *Environmental Science and Technology, Environmental Science: Nano, Chemical Engineering Journal, ACS Applied Materials & interfaces, Journal of Materials Chemistry A etc.*

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PERFORMANCE ANALYSIS OF AN ALGAL-ACTIVATED SLUDGE SYMBIOTIC SYSTEM ON WASTEWATER TREATMENT, ALGAL-ACTIVATED SLUDGE CHARACTERISTICS AND COMMUNITY STRUCTURE: EFFECT OF SLUDGE CONCENTRATION

Li Sun, Yu Tian and Jun Zhang
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This study focused on the effect of different sludge concentration on the performances of an algal-activated sludge symbiotic system in terms of wastewater treatment, algal-activated sludge characteristics and community structure. The results showed that the highest wastewater treatment performances were obtained in the reactor R2 (sludge concentration of 700 mg/L) with sCOD, NH_4^+-N and PO_4^{3-}-P removal efficiencies of 90.6±2.3%, 97.69± 2.6% and 83.81±2.3% respectively. The relative coefficient between Chlorophyll-a (Chl-a) concentration and nutrients removal was in the declining trend of NH_4^+-N > PO_4^{3-}-P > sCOD, and decreased with the increase of sludge concentration indicating the increased sludge concentration inhibited the growth of algae. Further investigation exhibited that different sludge concentration resulted in the changes of dissolved oxygen (DO) and pH influencing the wastewater treatment and algae growth in the symbiotic system. Under the situation of nutrient deficiency, algae displayed superior nutrient utilization ability than sludge bacteria, contributing to the death and disintegration of sludge bacteria which led to the decline of total soluble solid (TSS) content after day 4. In addition, analysis on the extracellular polymeric substances (EPS) production and Ps/Pr results revealed that the better nutrients removal and algae growth and the preferable settleability in R2 was positively related to its higher EPS production (99.79 mg/g-VSS) and Ps/Pr. The denaturing gradient gel electrophoresis (DGGE) profiles and gene sequences analysis demonstrated that some new species appeared and the functional microorganism was enriched under different sludge concentration, suggesting that both bacteria and algae had a selective power for particular members of each other. This study would provide some novel insights into the relationship between algal-activated sludge and be helpful to develop the algae-activated sludge system.

Biography

Li Sun is from School of Environment in Harbin Institute of Technology. She is also a PhD candidate and a member of the State Key Laboratory of Urban Water Resource and Environment.

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OPTIMIZATION OF THE DETERMINATION METHOD FOR DISSOLVED CYANOBACTERIAL TOXIN BMAA IN NATURAL WATER

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There is a serious dispute on the existence of β-N-methylamino-L-alanine (BMAA) in water, which is a neurotoxin that may cause amyotrophic lateral sclerosis/Parkinson's disease (ALS/PDC) and Alzheimer' disease. It is believed that a reliable and sensitive analytical method for the determination of BMAA is urgently required to resolve this dispute. In the present study, the solid phase extraction (SPE) procedure and the analytical method for dissolved BMAA in water were investigated and optimized. The results showed both derivatized and underivatized methods were qualified for the measurement of BMAA and its isomer in natural water; limit of detection and the precision of the two methods were comparable. Cartridge characteristics and SPE conditions could greatly affect the SPE performance, and the competition of natural organic matter is the primary factor causing the low recovery of BMAA, which reduced from approximately 90% in pure water to 38.11% in natural water. The optimized SPE method for BMAA was a combination of rinsed SPE cartridges, controlled loading, elution rates and elution solution evaporation at 55°C, reconstitution of a solution mixture and filtration by polyvinylidene fluoride membrane. This optimized method achieved > 88% recovery of BMAA in both algal solution and river water. The developed method can provide an efficient way to evaluate the actual concentration levels of BMAA in actual water environments and drinking water systems.

Biography

Boyin Yan is a Doctoral candidate in School of Municipal and Environmental Engineering, Harbin Institute of Technology (HIT), China. She attained a Bachelor's degree from HIT. Her major is Environmental Engineering and her research focuses the study of cyanobacterial toxins in eutrophic water such as developed effective determination methods for new cyanobacterial toxins, the detection of cyanobacterial toxins in eutrophic water and the removal of cyanobacterial toxins. Until now, she has published one paper as first author in foreign journal.

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DEVELOPMENT OF THE DISCUSSION-STYLE INSTRUCTION STRATEGY USING TV ENTERTAINMENT PROGRAM IN ECOLOGY CLASS

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Real variety programs based not in the city but in the countryside are loved steadily and are on the rise nationally in Korea. On the other hand, as the city grows in size, people are having less and less opportunities to experience the diversity of nature in daily life. Schools often use diverse media to teach ecology in the classroom for convenience, instead of going out into the field. Therefore, this study presented discussion style instruction strategy with effective questionings using TV entertainment programs. The aim of the instruction is not only easy application which can lead to high accessibilities for the teachers in city schools but also boosting the ecological literacy of middle school students.

Recent Publications

1. Nho H, Lee H, Lee S, Jung J, Park J and Choi J (2013) Diversity of useful marine molluscs in Korea " , Ministry of Oceans and Fisheries.

2. Kim. H, Jung. J (2014), " The record of animals in Joseon Dynasty ",West Sea Collection .

Biography

WoonJung Yoon is on a course of a master's degree of Ecology Education from Ewha Womans University. She has interest especially in education, so along with academical efforts she has done various learning services and experienced internships at child-related NGO. In 2017 she taught science for a part-time at a public middle school.

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MOBILITY RETARDATION OF CD, PB, MN IN ACID SOIL USING PHOSPHATE FERTILIZERS

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Contamination of heavy metals in soil is a major problem that causes damage to the environment. The research was carried out to study the efficiency of phosphate fertilizer, including phosphate rock, diammonium phosphate, and monopotassium phosphate at 0, 2.5, 5 and 7.5 g/kg soil to stabilize lead, cadmium, and manganese contaminated soil. The soil collected from Rayong Province which is one of the most industrialized provinces in Thailand. The stabilizers were applied to an acid sandy clay loam soil for one month. The pH value, the total concentration of heavy metals, heavy metal forms in soil by six step sequential extraction and potential to enter the biological system by single step extraction (EDTA, NH_4OAc, DTPA, and $CaCl_2$) were studied. The results showed that phosphate rock, diammonium phosphate, and monopotassium phosphate increase soil pH from 3.60 to 6.5, 7.0 and 5.2 respectively. Phosphate fertilizers could change unstable forms (water extractable, exchangeable, and bound to carbonates form) to more stable forms (bound to Fe and Mn-oxides, bound to organic matter, and residual form) of heavy metals. Phosphate rock (7.5 g /kg soil) has the highest potential for reducing the mobility of all three metals (about 80% for Mn, 60% for Cd, and 50% for Pb), followed by monopotassium phosphate. The results obtained from the extraction with diethylene triamine penta acetic acid (DTPA) and $CaCl_2$ were found closely related to the results obtained from the sequential extraction method. Phosphate rock was the best to reduce potentially toxic metals phytoavailability. Soil improvement with phosphate fertilizer was considered a good alternative for stabilizing soils contaminated with cadmium, lead, and manganese.

Recent Publications

1. Chaiyaraksa C, Jaipong T, Tamnao P and Imjai A (2017) Durian and mangosteen shell-derived biochar amendment on the removal of zinc, lead and cadmium. Thammasat International Journal of Science and Technology 22:87-97.

Biography

C Chaiyaraksa has completed her MSc degree in Analytical Chemistry from Bristol University, UK and PhD in Environmental Engineering from Asian Institute of Technology (AIT), Thailand. She is working as a Lecturer at King Mongkut's Institute of Technology Ladkrabang since 1998. She teaches Hazardous Waste Management, Air Pollution Control, Environmental Impact Assessment and Environmental Chemistry. In 2017, she contributed her research works in many conferences (three papers in Thailand, one paper in UK, one paper in Egypt). She is a Reviewer for Journal of Cleaner Production and Thammasat International Journal of Science and Technology. Her research grants this year are on the topic: Adsorption of copper (II) and nickel (II) by chitosan-modified magnetic biochar derived from *Eichhornia crassipes* and immobilization of cadmium in soil using magnetic biochar derived from *Eichhornia crassipes.*

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ADAPTIVE THE RULE-APPROXIMATION TO FIND THE AREA OF A SWIMMING POOL

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The management team of a naturalistic village nearly AMATA, Chonburi, Thailand needs to construct a swimming pool that look on the top view like a leaf or heart. Because of the pools irregular shape that all depth is 1.8 m, the approximated size is 15x30 m, the team has to the area for a pool contractor solving the cost for this leaf or heart swimming pool. Since this problem and the main objective of the customer need approximating to a leaf or heart swimming pool cost, sketching shape and analyzing is done. To analyze by applied mathematics, the integration and numerical method (the trapezoidal rule) are solved. Finally, this estimated cost is 16,000.00 Thai baht per m^2 and over all about 108.75 x 16,000=1,740,000.00 Thai baht that is about 52,000$

Recent Publications

1. Sarawut Suwannaut and Kanchana Kuimnungkit, Analysis of Effective Neurospora Process Model, International Conference in Mathematics and Applications MAHIDOL University 2011,367-373

2. Tatiporn Pattranurakyothin and Kanchana Kumnungkit, Forecasting Model for Para Rubber's Export Sales, The Third KMITL-TKU Joint International Symposium on Mathematics and Applied Mathematics (MAM2012), 28-29 July 2012, 120-124

3. Kanchana Kumnungkit, Application of Flat Rate or Compound Rate Using, Conference of the International Journal of Arts & Sciences, CD-ROM. Issn:1943-6114 : 07(03), 2014,379-384

4. Kanchana Kumnungkit, Wariya Chatsut, Wittaya Krabuanri, Sawitree Hongsa and Tatiporn Pattranurakyothi,New Computer Program to Simulate a Neurospora Biorhythm, 3rd International conference of supply chain & Technology Innovation proceeding, Sep 5-9 , 2016,16-23

5. K. Kumnungkit, S. Suwannaut, Comparative Neurospora Biorhythms on light VS light with Frq Protein, www.diogenes.bg/ijam/contents/2017-30-1/5/index.html, International Journal of Applied Mathematics, 2017, 59-71. ISSN: 1311-1728 (printed version); ISSN: 1314-8060 (on-line version).

Biography

Kanchana Kumnungkit completed her PhD in 2005 from Mahidol University, Faculty of Science, Department of Mathematics. She is working at Mathematics Department, Faculty of science, King Mongkut's Institute of Technology Ladkrabang, Bangkok, Thailand since 1994. Now She is the head of the department and her interest is in mathematical modelling fields.

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RECONSTRUCTION OF LEAD POLLUTION HISTORY BASED ON ANALYSIS OF CORAL SKELETON SAMPLES

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[2]Okayama University, Japan
[3]National Institute of Advanced Industrial Science and Technology, Japan
[4]Ryukoku University, Japan
[5]Autonomous University of Santo Domingo, Dominican Republic

The skeleton of brain corals (*Diploria strigosa*) collected near the mouth of Haina River in Saint Domingo, Dominican Republic, were analyzed for lead (Pb) in order to reconstruct the history of local pollution of heavy metals in the river catchment area. The micro-samples from the sampling transect along the growth axis of a coral colony (Colony id: SDM13-02) were prepared to study the temporal variability of heavy metal loading from the Haina River. The Pb concentrations in the skeletal samples were measured using an inductively coupled plasma mass spectrometer. Since annual banding in the coral skeleton was not clear, we measured Sr/Ca ratios of micro-samples to determine the age of the coral colony. The age model was constructed by matching Sr/Ca ratio variations with seawater temperature since skeletal Sr/Ca ratio predominantly reflects seawater temperature. The Pb concentrations near the bottom of the colony, which corresponds to the skeletal portion precipitated around 2000, were significantly high as compared to the remaining part of the skeletal transect with Pb variations of baseline/background levels. Another coral colony collected nearby SDM13-02 colony also showed similar temporal variation of Pb along the growth axis. The results suggest that the coral Pb profiles presumably reflect the pollution history of the coastal area off Haina River mouth. Further investigation is required to confirm coral ability for reconstructing heavy metal pollution in the coastal areas. Corals may be unique archives not only for past climate records but also for pollution history.

Recent Publications

1. Satoshi Nakai, Jun-ya Shibata, Akira Umehara, Tetsuji Okuda and Wataru Nishijima (2018) Filtration rate of the ascidian Ciona savignyi and its possible impact. Thalassas: An International Journal of Marine Sciences DOI: 10.1007/s41208-017-0061-y.

2. Bell T, Nishida K, Ishikawa K, Suzuki A, Nakamura T, Sakai K, Ohno Y, Iguchi A and Yokoyama Y (2017) Temperature-controlled culture experiments with primary polyps of coral *Acropora digitifera*: calcification rate variations and skeletal Sr/Ca, Mg/Ca, and Na/Ca ratios. Palaeogeography, Palaeoclimatology, Palaeoecology DOI: 10.1016/j.palaeo.2017.03.016

3. Nakamura T, Iguchi A, Suzuki A, Sakai K and Nojiri Y(2017) Effects of acidified seawater on calcification, photosynthetic efficiencies, and the recovery processes from strong light exposure in coral *Stylophora pistillata*. Marine Ecology DOI: 10.1111/maec.12444

4. Iwasaki S, M Inoue, A Suzuki, O Sasaki, H Kano, A Iguchi, K Sakai and H Kawahata (2016) The role of symbiotic algae in the formation of the coral polyp skeleton: 3-D morphological study based on X-ray microcomputed tomography. Geochemistry, Geophysics, Geosystems 17:3629-3637.

5. Wataru Nishijima, Akira Umehara, Satoshi Sekito, Tetsuji Okuda and Satoshi Nakai (2016) Spatial and temporal distributions of secchi depths in the Suo Nada of the Seto Inland Sea, Japan, exposed to anthropogenic nutrient loading, Science of the Total Environment 571:543-550.

Biography

Satoshi Nakai has completed his PhD in Tokyo University of Agriculture and Technology and Postdoctoral studies from the Japan Society for the Promotion of Science. He is a Professor at Faculty of Engineering, Hiroshima University, Japan. He has published more than 100 papers in journals.

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STUDY ON THE PROCESS OF DECISION MAKING AND CHANGE IN THE ENVIRONMENT-SPECIFIC OF ENVIRONMENTAL ISSUES FOR MIDDLE SCHOOL STUDENTS : FOCUSED ON FINE DUST

Sangeun Shin

Ewha Womans University, South Korea

As the concentration of population is accelerating in the urban areas, various environment-related issues are emerging in Korea. As the government recently decided to make public statements on the resumption of construction of Sin-Gori units no. 5 and 6 construction, the public is also more comfortable and responsible in the decision-making process of environment-related issues. Various environmental issues exist, but it is still small enough to understand them and solve them by taking care of communication and decision making. Since the introduction of the revised curriculum 2015 has emphasized the decision making aspects of the national education objectives more, learning mechanisms that focus on environment-related issues need to be practiced by students. The aspects seen in previous studies with regard to particulate matters are to provide sufficient learning and information about fine dust, starting with the definition of particulate matters or to be measured and then to be shown as numerical values (Park, 2014). If the existing classes are enough to verify students ' perceptions, it is necessary to take a step forward by changing the ones based on the recognition.

Therefore, to analyze the causes and results of particulate matter, the system accident activity is carried out to identify the causes of particulate matter and to carry out the activities for the previous study. A discussion on environmental issues related to particulate matters is pursued with immersion in hand, and the overall method of class will be a Havruta(The Jewish traditional model of debating learning) model.

Reference was made to a prior study of the Havruta model to develop a immersion discussion program. Havruta is generally described as a three-level organization in which listening, speaking clearly, and asking questions are key points, and supporting or criticizing opinions(Kent, 2010; Choi, 2016, Huh, 2016). The Havruta classroom model can be applied differently depending on the subjects associated with it, such as the interrogatory Havruta, the argumentative Havruta, the comparative center Havruta, and the making up of a friend Havruta(Choi, 2017). Usually, the science curriculum makes use of the question-oriented Havruta model, but since environmental education requires convergence, it is applied to the class by assessing the suitability of each subject. The topic of fine dust is to be used, as the argument-oriented havruta appears to be the appropriate model of instruction. The argumentative-oriented Havruta process is based on a basic structure : a thesis, a group discussion, and a presentation.

The first difference between the existing fine dust classes is that they are not limited to the provision of knowledge and information, but rather to the discussion and consideration of the surrounding situations, and the second is the student-oriented class. In order to participate in the class, individual students need to participate actively, such as advance research or opinion generation. Finally, I think the most different thing is to cultivate the environment and the effect of this program because it can draw attention to environmental issues other than the contents of textbooks.

Because this study aims to determine whether the environment quality changes by learning the decision process for environment-related issues, further studies are needed to determine the actual effectiveness of the environment. It is expected that a variety of more effective student-focused methodologies will be developed during the classroom progression on these environmental issues.

Recent Publications

1. Kim Y S and Shin S E (2017) Suggestions for environmental education to develop personality and creativity along with college students' environmental consciousness. Journal of Learner-Centered Curriculum and Instruction 17(3):451-472.

2. Kim Y S and Shin S E (2017) The effect of microbial treatment and light intensity on indoor dracaena foliage color. Journal of Korea Society of Color Studies 31(3):113-119.

3. Shin S E and Kim Y S (2015) A study on necessity of color education for early childhood education teachers based on the analysis of the color education status in nuri curriculum. Journal of Korea Society of Color Studies 29(3):97-106.

Biography

SangEun Shin is on a course of a doctor's degree of Ecology Education from Ewha Womans University. She's interested in the convergence of the environmental ecology field. So She is working on Eco-Sensitivity. She teaches Ecology and Environment at Sahmyook University. She also teaches botany in many gardens, such as Everland garden.

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ISOLATION AND CHARACTERIZATION OF PHOSPHATE-SOLUBILIZING MICROORGANISMS WITH BIO CONTROL POTENTIAL FROM SALT-AFFECTED SOIL

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Saline soils are widely distributed across the world. The application of beneficial microorganisms is a novel technology to reduce salt stress and improve plant productivity. Phosphate-solubilizing microorganisms (PSM) are a group of plant growth-promoting rhizobacteria, which can dissolve insoluble phosphates and maintain the nutrient status of salt soil. To identify efficient PSM with multiple activities that promote the plants to grow in the saline soil, we conducted a survey of PSM naturally colonizing saline soil of the Yellow River, China. A total of 42 PSMs were isolated, the majority clustered together as *Bacillus* spp., one *Providencia rettgeri* sp. strain was confirmed as PSM for the first time. The capacity of dissolving inorganic phosphorus analysis was carried out by agar plate and liquid culture. Ten isolates classified as the best solubilizers with solubilization rates greater than 200 mg/L. In contrast, the PSM isolates were less effective when solubilizing ferric phosphate ($FePO_4$) or aluminum phosphate ($AlPO_4$). The organic acid types and content were tested by high performance liquid chromatography (HPLC) method. Eight different organic acids (oxalic acid, gluconic acid, lactic acid, succinic acid, formic acid, citric acid and malic acid and propionic acid) with different content were detected in the culture filtrates. Isolates were also checked for indole-3-acetic acid (IAA), siderophore and exopolysaccharide. All of the isolates could secrete IAA within the range 2.7~31.8 mg L/1 and exopolysaccharide within the range 74.3~225.7 mg L/1. There were 12 (28.6% of the total strains) siderophore-producing strains with the siderophore unit of 1.9~42.1%. This initial study on PSM isolates distributed in saline soil showed that some isolates show promise for potential use as bio-inoculants for promoting plant growth in saline environments.

Biography

Huanhuan Jiang is pursuing her PhD degree in Environmental Engineering at Harbin Industrial University and will complete her PhD in June 2018. Her research interests cover the theory and application of resources recovery from waste (water)/bio solids, organic wastes (excess sludge, waste bio-mass, etc.) cascade utilization to recover bio resources and/or bioenergy, soil restoration and soil fertility by Microbial e.g. She has participated in the project of China Agriculture Research System, The National Natural Science Foundation of China etc. At the period of her graduate study, her four papers were under review.

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THE EFFECT OF SOIL CULTIVATION PRACTICES IN SUNFLOWER HELIANTHUS ANNUS CULTIVATION

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The objective of this work was to investigate the effect of different soil cultivation practices in sunflower cultivation. For this purpose an experimental field was established in central Greece (in Larissa). The minimum slope percent of the field was 5% while treatments being applied were both conventional tillage and no-tillage with two tillage directions (contour and inclination). There were four treatments with three replications each. The treatments were conventional tillage - contour direction (CT-CD), no tillage - contour direction (NT-CD), conventional tillage - inclination direction (CT-ID) and no tillage - inclination direction (NT-ID). Sunflower was sown on July 6th 2015 and was harvested on October 10th 2015. During the experiment generation, plant height, leaf surface and total biomass were measured. According to the results the best germination noticed in the CT-ID treatment. Plant height ranged from 64.9 cm to the CT-CD treatment to 85.2 cm to the CT-ID treatment. Also, the total biomass weight was higher in CT-CD treatment and lower in NT-ID treatment. Therefore, the soil cultivation practices play an important role in plant growth, in biomass and in yield production.

Biography

Molla A has completed her PhD from the University of Thessaly, School of Agricultural Sciences, Department of Agriculture Crop Production and Rural Environment Soil Science Lab and Postdoctoral studies from the Department of Soil Water Resources, National Agricultural Research Foundation, Greece. She has published nine papers in reputed journals and 11 papers in international conferences.

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WATER RECYCLING- WASTE WATER TREATMENT PLANT AT BADOVC

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Seeing the climate changes effect and SDG-6 by, RWC Pristina developed a strategic plan towards source protection, and proper water source management. Currently RWC Pristine is using different water source, surface and underground, but still Badovc Lake is one of the biggest and most important sources. Since 1965 when Badovc Lake is filled, its destination from the beginning was to use it, also as a water source for population of capital city of Pristina. Meanwhile there were a population growth and with this automatically came to a need for more water, and in other side more potential pollutant on the streams, river and then lake. Seeing from this point of view RWC Pristina has invested on source protection, and finally in 2017 started to operate fully with waste water treatment plant (WWTP). This WWTP is constructed in lowest part of village Mramor. Previously all the sewage has been discharged directly on the stream, and then this stream was discharging into Badovc Lake. On 2016 it was constructed a sewage line, which now discharges firstly into inlet of WWTP, this waste water go through biological treatment process and finally discharges again in the stream, river that fills Badovc Lake. From Badovc Lake water goes for treatment through pump station to water treatment plant and then it goes to distribution water supply system.

Biography

Sokol Xhafa holds a Master of Science degree in Water Engineering, studied at Polytechnic University of Tirana. His career started as an Engineer on 2006, as a Reconstruction Contractor for European Agency. He has experience in distribution water supply systems, dams, water power plants, and other related water engineering facilities. He was a part of different national and international conferences in region and Europe. He holds the position of Technical Director at RWC Pristina which is a biggest water utility in Kosova. He is also a Lecturer at University of Business and Technology in Pristina and he is Chair Leader of Young Water Professionals Group in Kosovo.

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THE SPATIAL PATTERN OF FOREST COVER CHANGES IN LITHUANIA DURING THE SECOND HALF OF THE TWENTIETH CENTURY

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The trends of forest cover change in Lithuanian municipalities are introduced in the current paper. Two sources of information on the forest cover in 1950s and today (2013) were used in this study: (i) a geographic forest cover database developed using historical orthophotomaps based on aerial photography, which was carried out in the period just after the World War II, and (ii) the information originating from the State Forest Cadaster and referring to the year 2013. These two layers were compared using GIS overlay techniques. The data was made available for the analyses aggregated up to the municipality level. The Global Moran's I statistic and Anselin Local Moran's I were used to identify global and local patterns in the distribution of forest cover characteristics in Lithuanian municipalities, respectively. The main finding of this study was that the proportion of the forest cover in 1950 was 26.5%, i. e. notably differing from the official statistics − 19.7%. The proportion of the forest cover increased in all municipalities during the period 1950−2013. The largest increase in forest cover proportion was in the areas less suitable for agriculture. The relatively largest areas of new forests were identified in the south-eastern part of Lithuania, the deforestation was relatively slowest around less forested municipalities, while the afforestation was relatively slowest around the agricultural Pakruojis municipality. Deforestation was most commonly associated with the forest transformation into agricultural land, less often into scrublands or waters.

Keywords − forest cover changes, afforestation, deforestation, spatial statistics

Biography

Daiva juknelienė was a lecture at Institute of Land Management and Geomatics. Her research fields are land law, sustainable land management and spatial planning. She was published more than 20 papers in reputed journals and has been serving as an editorial board member of repute.

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