

Hot Articles

“August | 2019”

Science and Technology



Title: [Interface monitoring of steel-concrete-steel sandwich structures using piezoelectric transducers](#)

Author: Jiachuan Yan | Wensong Zhou | Xin Zhang | Youzhu Lin

Journal: Nuclear Engineering and Technology

Volume 51 **Issue:** 4 **Page:** 1132 - 1141

Doi: <https://doi.org/10.1016/j.net.2019.01.013>

Abstract

Steel-concrete-steel (SCS) sandwich structures have important advantages over conventional concrete structures, however, bond-slip between the steel plate and concrete may lead to a loss of composite action, resulting in a reduction of stiffness and fatigue life of SCS sandwich structures. Due to the inaccessibility and invisibility of the interface, the interfacial performance monitoring and debonding detection using traditional measurement methods, such as relative displacement between the steel plate and core concrete, have proved challenging. In this work, two methods using piezoelectric transducers are proposed to detect the bond-slip between steel plate and core concrete during the test of the beam. The first one is acoustic emission (AE) method, which can detect the dynamic process of bond-slip. AE signals can be detected when initial micro cracks form and indicate the damage severity, types and locations. The second is electromechanical impedance (EMI) method, which can be used to evaluate the damage due to bond-slip through comparing with the reference data in static state, even if the bond-slip is invisible and suspends. In this work, the experiment is implemented to demonstrate the bond-slip monitoring using above methods. Experimental results and further analysis show the validity and unique advantage of the proposed methods.

Database

ScienceDirect

Title: [SmPFT: Social media based profile fusion technique for data enrichment](#)

Author: Amit Agarwal | Durga Toshniwal

Journal: Computer Networks

Volume 158 **Issue:** - **Page:** 123 - 131

Doi: <https://doi.org/10.1016/j.comnet.2019.04.015>

Abstract

People use different social networking platforms for distinct purposes. The information across each micro-blogging site is often partial. A better profile of an individual can be built, if we amalgamate the complementary information from various sites. This data enrich profile can be useful in a number of online services i.e. marketing of any product across sites, friend recommendation, etc. To integrate profile information, it is essential to identify individuals in distinct social networking platforms. This study aims to identify identical users across different social media platforms. Existing works on user profile matching frameworks are restricted to certain social networks as some of the previously available streaming APIs are not available now. In this work, there are no such dependencies over the streaming APIs as it is based on the uniqueness of usernames, which are identical among various social networking sites. We also efficiently exploit the information redundancies, due to individual similar behavioral patterns which can be used during mapping. We have tested our system over 500 users in the real-time scenario, considering only those profiles which generate their content predominately in the English language. The total dataset comprises of over 1.1 Million tweets and 0.63 Million URLs, in which 35.6% URLs contained the geotagged information. Our model is able to identify 6.3% more identical users than the traditional approaches. There are several application areas such as friends recommendation, future place prediction, leaders identification, and information diffusion across social media sites that can benefit from the outcoming of this work.

Database

ScienceDirect

Title: [Electronic and Geometric Structures of Rechargeable Lithium Manganese Sulfate Li₂Mn\(SO₄\)₂ Cathode](#)

Author: Disha Gupta | Aravind Muthiah | Minh Phuong Do | Gopinathan Sankar | Timothy I. Hyde | Mark Patrick Copley | Tom Baikie | Yonghua Du | Shibo Xi | Madhavi Srinivasan | ZhiLi Dong

Journal: ACS Omega

Volume 4 **Issue:** 7 **Page:** 11338 - 11345

Doi: <https://doi.org/10.1021/acsomega.9b00356>

Abstract

Here, we report the use of Li₂Mn(SO₄)₂ as a potential energy storage material and describe its route of synthesis and structural characterization over one electrochemical cycle. Li₂Mn(SO₄)₂ is synthesized by ball milling of MnSO₄·H₂O and Li₂SO₄·H₂O and characterized using a suite of techniques, in particular, ex situ X-ray diffraction, X-ray photoelectron spectroscopy, and X-ray absorption spectroscopy on the Mn and S K-edges to investigate the electronic and local geometry around the absorbing atoms. The prepared Li₂Mn(SO₄)₂ electrodes undergo electrochemical cycles to different potential points on the charge–discharge curve and are then extracted from the cells at these points for ex situ structural analysis. Analysis of X-ray absorption spectroscopy (both near and fine structure part of the data) data suggests that there are minimal changes to the oxidation state of Mn and S ions during charge–discharge cycles. However, X-ray photoelectron spectroscopy analysis suggests that there are changes in the oxidation state of Mn, which appears to be different from the conclusion drawn from X-ray absorption spectroscopy. This difference in results during cycling can thus be attributed to electrochemical reactions being dominant at the surface of the Li₂Mn(SO₄)₂ particles rather than in the bulk.

Database

American Chemical Society Journal (ACS)

Title: [Identification and Quantification of Modified Nucleosides in *Saccharomyces cerevisiae* mRNAs](#)

Author: Mehmet Tardu | Joshua D. Jones | Robert T. Kennedy | Qishan Lin | Kristin S. Koutmou

Journal: ACS Chemical Biology

Volume 4 **Issue:** 7 **Page:** 1403 - 1409

Doi: <https://doi.org/10.1021/acscchembio.9b00369>

Abstract

Post-transcriptional modifications to messenger RNAs (mRNAs) have the potential to alter the biological function of this important class of biomolecules. The study of mRNA modifications is a rapidly emerging field, and the full complement of chemical modifications in mRNAs is not yet established. We sought to identify and quantify the modifications present in yeast mRNAs using an ultra-high performance liquid chromatography tandem mass spectrometry method to detect 40 nucleoside variations in parallel. We observe six modified nucleosides with high confidence in highly purified mRNA samples (N7-methylguanosine, N6-methyladenosine, 2'-O-methylguanosine, 2'-O-methylcytidine, N4-acetylcytidine, and 5-formylcytidine) and identify the yeast protein responsible for N4-acetylcytidine incorporation in mRNAs (Rra1). In addition, we find that mRNA modification levels change in response to heat shock, glucose starvation, and/or oxidative stress. This work expands the repertoire of potential chemical modifications in mRNAs and highlights the value of integrating mass spectrometry tools in the mRNA modification discovery and characterization pipeline.

Database

American Chemical Society Journal (ACS)

Title: [In Situ Surface Tension Measurements of Hanging Droplet Methylglyoxal/Ammonium Sulfate Aerosol Mimics under Photooxidative Conditions](#)

Author: Thomas Beier | Emily R. Cotter | Melissa M. Galloway | Joseph L. Woo

Journal: ACS Earth and Space Chemistry

Volume 3 **Issue:** 7 **Page:** 1208 - 1215

Doi: <https://doi.org/10.1021/acsearthspacechem.9b00123>

Abstract

Dark-chemistry products of ammonium sulfate (AS) and methylglyoxal (MG) have been observed to be surface-active, resulting in changes to solution surface tension with relatively small amounts of organic loading. These same solutions have been observed to be unstable under exposure to ultraviolet (UV) radiation, although the surfactant properties of these products have not been characterized. Here, small (10 μL) droplets of aged MG/AS solutions of varying organic concentration are suspended under dark and irradiated conditions and measured via hanging drop profile tensiometry. Irradiated droplets were exposed to broadband UV radiation ($\lambda_{\text{max}} = 254 \text{ nm}$) for durations up to 3 h. Solution surface tension was observed to depress upon exposure to radiation, dependent upon magnitude and duration of radiation. Solution organic loading was observed to not statistically affect the extent of surface tension depression. Bulk solution UV/visible absorbance measurements indicated a slight increase in the 280 nm absorption after exposure, contrary to similar bulk solution studies performed on similar systems. Electrospray ionization mass spectrometry analysis indicates an increase of signal in masses consistent with previously observed chromophoric MG/AS products after irradiation, suggesting that the sustained gas–droplet interface in which condensed-phase photochemistry takes place may have an effect on the prevailing aqueous secondary organic aerosol products that form.

Database

American Chemical Society Journal (ACS)

Title: [CTRL-ALT-LED: Leaking Data from Air-Gapped Computers Via Keyboard LEDs](#)
Author: Mordechai Guri | Boris Zadov | Dima Bykhovsky | Yuval Elovici
Journal: 2019 IEEE 43rd Annual Computer Software and Applications Conference (COMPSAC)
Doi: <https://doi.org/10.1109/COMPSAC.2019.00118>

Abstract

Fasting influences the overall physiology of fish, and the knowledge how the gut microbiota, growth performances, and immune function in response to intermittent and long-term fasting is still insufficient. Here, we characterized the effects of fasting on the host-gut microbiota in crucian carp, which would enhance our insight into physiological adaptation to fasting. To achieve this, we investigated the gut microbial communities of crucian carp with different fasting stress, and corresponding immune and growth parameters. The gut microbial communities were structured into four clusters according to different fasting stress, namely one control group (feed regularly), two intermittent fasting groups (fasting period and re-feeding period, respectively), and one long-term fasting group. Intermittent fasting significantly improved the activity of superoxide dismutase (SOD) and lysozyme (LZM) (ANOVA, $p < 0.05$) and significantly increased alpha diversity and ecosystem stability of gut microbiota (ANOVA, $p < 0.05$). Gut length (GL) and condition factor (CF) showed no significant difference between the control group (CG) and intermittent fasting group under re-feeding period (RIF) (ANOVA, $p = 0.11$), but relative gut length (RGL) in group RIF was higher than that in the CG (ANOVA, $p = 0.00$). The bacterial genera *Bacteroides*, *Akkermansia*, and *Erysipelotrichaceae* were enriched in fishes under intermittent fasting. Two *Bacteroides* OTUs (OTU50 and OTU1292) correlated positively with immune (SOD, complement, and LZM) and growth (GL and RGL) parameters. These results highlight the possible interplay between growth performances, immune function, and gut microbiota in response to fasting.

Database

IEEE/IET Electronic Library (IEL)

Title: [Wireless Communications and Applications Above 100 GHz: Opportunities and Challenges for 6G and Beyond](#)

Author: Theodore S. Rappaport | Yunchou Xing | Ojas Kanhere | Shihao Ju | Arjuna Madanayake | Soumyajit Mandal | Ahmed Alkhateeb | Georgios C. Trichopoulos

Journal: IEEE Access

Volume: 7 **Issue:** - **Page:** 78729 - 78757

Doi: <https://doi.org/10.1109/ACCESS.2019.2921522>

Abstract

Frequencies from 100 GHz to 3 THz are promising bands for the next generation of wireless communication systems because of the wide swaths of unused and unexplored spectrum. These frequencies also offer the potential for revolutionary applications that will be made possible by new thinking, and advances in devices, circuits, software, signal processing, and systems. This paper describes many of the technical challenges and opportunities for wireless communication and sensing applications above 100 GHz, and presents a number of promising discoveries, novel approaches, and recent results that will aid in the development and implementation of the sixth generation (6G) of wireless networks, and beyond. This paper shows recent regulatory and standard body rulings that are anticipating wireless products and services above 100 GHz and illustrates the viability of wireless cognition, hyper-accurate position location, sensing, and imaging. This paper also presents approaches and results that show how long distance mobile communications will be supported to above 800 GHz since the antenna gains are able to overcome air-induced attenuation, and present methods that reduce the computational complexity and simplify the signal processing used in adaptive antenna arrays, by exploiting the Special Theory of Relativity to create a cone of silence in over-sampled antenna arrays that improve performance for digital phased array antennas. Also, new results that give insights into power efficient beam steering algorithms, and new propagation and partition loss models above 100 GHz are given, and promising imaging, array processing, and position location results are presented. The implementation of spatial consistency at THz frequencies, an important component of channel modeling that considers minute changes and correlations over space, is also discussed. This paper offers the first in-depth look at the vast applications of THz wireless products and applications and provides approaches

Database

IEEE/IET Electronic Library (IEL)

Title: [Development of Green Composites Based on Polypropylene and Corncob Agricultural Residue](#)

Author: R. R. F. Ramos | D. D. Siqueira | R. M. R. Wellen | I. F. Leite | G. M. Glenn | E. S. Medeiros

Journal: Journal of Polymers and the Environment

Volume 27 **Issue:** 8 **Page:** 1677 - 1685

Doi: <https://doi.org/10.1007/s10924-019-01462-7>

Abstract

Green composites of polypropylene (PP) and corncob (CCB) agricultural residue with CCB content ranging from 5 to 30 wt% were compounded by melt extrusion and their properties investigated by density measurements, thermogravimetric analyses, differential scanning calorimetry, scanning electron microscopy (SEM) and tension, flexural and impact properties. Properties were dependent on CCB content. SEM micrographs showed that PP/CCB composites are composed of all layers of the corncob, but with a higher content of woody ring and pith. Composites with CCB up to 20 wt% presented particles evenly dispersed into PP matrix and density values ranging from 0.929 to 1.026 g/cm³. Thermal analyses showed that CCB is thermally stable up to 200 °C, ensuring that no degradation took place during processing, and PP/CCB composites are more crystalline than neat PP. Tensile strength and elongation at break of the composites decreased respectively from 30 to 20 MPa, and 22.7 to 3.7%, and the elastic modulus increased while the impact strength remained practically constant at 14 J/m for the filling contents tested. Elastic and flexural moduli increased respectively from 906 MPa to 1.1 GPa and from to 1.26 to 1.81 GPa with corncob addition.

Database

SpringerLink

Title: [Sequestration of CO₂ into CaCO₃ using Carbonic Anhydrase Immobilization on Functionalized Aluminum Oxide](#)

Author: H. K. Lim | D. R. Kim | I. T. Hwang

Journal: Applied Biochemistry and Microbiology

Volume 55 **Issue:** 4 **Page:** 375 - 379

Doi: <https://doi.org/10.1134/S0003683819040112>

Abstract

To develop the technology for CO₂ sequestration, the free and immobilized carbonic anhydrase treatment was performed. The amount of dissolved CO₂ was increased by 3-fold after enzyme treatment of 5 ppm, and the amount of calcium carbonate increased linearly as the CaCl₂ was increased to 100 mM. To immobilize the carbonic anhydrase, an aluminum oxide carrier surface was functionalized with octadecyltrichlorosilane, 1H,1H,2H,2H-perfluorooctyltriethoxysilane, 3-aminopropyltriethoxysilane, 3-mercaptopropyl triethoxysilane, chlorotrimethylsilane 3-cyanopropyltrichlorosilane or 3-glycidyloxypropyltriethoxysilane. The best effect among these substances was revealed with 3-aminopropyltriethoxysilane; the efficacy of the immobilized carbonic anhydrase was at over 99%, and even when it was repeatedly used up to 40 times, the efficacy of the immobilized enzyme was more than 80%. The optimal conditions for the immobilized enzyme were 60°C and pH 7.0.

Database

SpringerLink

Title: [Adaptation to Fasting in Crucian Carp \(*Carassius auratus*\): Gut Microbiota and Its Correlative Relationship with Immune Function](#)

Author: Tongtong Li | Mengting Qi | François-Joël Gatesoupe | Dongcan Tian | Weihua Jin | Jun Li | Qiang Lin | Shijin Wu | Huan Li

Journal: Microbial Ecology

Volume 78 **Issue:** 1 **Page:** 6 - 19

Doi: <https://doi.org/10.1007/s00248-018-1275-0>

Abstract

Fasting influences the overall physiology of fish, and the knowledge how the gut microbiota, growth performances, and immune function in response to intermittent and long-term fasting is still insufficient. Here, we characterized the effects of fasting on the host-gut microbiota in crucian carp, which would enhance our insight into physiological adaptation to fasting. To achieve this, we investigated the gut microbial communities of crucian carp with different fasting stress, and corresponding immune and growth parameters. The gut microbial communities were structured into four clusters according to different fasting stress, namely one control group (feed regularly), two intermittent fasting groups (fasting period and re-feeding period, respectively), and one long-term fasting group. Intermittent fasting significantly improved the activity of superoxide dismutase (SOD) and lysozyme (LZM) (ANOVA, $p < 0.05$) and significantly increased alpha diversity and ecosystem stability of gut microbiota (ANOVA, $p < 0.05$). Gut length (GL) and condition factor (CF) showed no significant difference between the control group (CG) and intermittent fasting group under re-feeding period (RIF) (ANOVA, $p = 0.11$), but relative gut length (RGL) in group RIF was higher than that in the CG (ANOVA, $p = 0.00$). The bacterial genera *Bacteroides*, *Akkermansia*, and *Erysipelotrichaceae* were enriched in fishes under intermittent fasting. Two *Bacteroides* OTUs (OTU50 and OTU1292) correlated positively with immune (SOD, complement, and LZM) and growth (GL and RGL) parameters. These results highlight the possible interplay between growth performances, immune function, and gut microbiota in response to fasting.

Database

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