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Editorial

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Surface Innovations

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Editorial

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Our international Editorial Advisory Board (EAB) continues to grow as we welcome our newest member, Professor Andrej Atrens of the University of Queensland in Australia. Professor Atrens is a well-respected international expert in the area of corrosion science and engineering. Together with previous 2018 additions to the EAB, including Professor Wolf-Dieter Müller from Charité Universitätsmedizin Berlin (Germany) and Professor Jonas Weissenrieder of KTH Royal Institute of Technology (Sweden), he will assist us in screening manuscripts related to surface and interfacial aspects of corrosion.

The journal is growing, broadening its content and increasing its visibility. The journal will sponsor two scientific meetings including the 2018 International Symposium on Advanced Materials & Sustainable Technologies that takes place on 22–25 July in Brisbane, Australia[1] and the First International Conference on Nature Inspired Surface Engineering to be held at the Stevens Institute of Technology (NJ, USA) on 12–14 June 2019.[2] Both meetings have impressive programs with keynote speakers who are at the forefront of science and engineering. We would like to assure readers that we are always interested in participation – and sometimes sponsorship – of scientific meetings, which attract quality speakers and presentations on cutting edge topics related to surfaces and interfaces.

ICE Publishing informed us recently that the number of 2017 downloads for articles published in *Surface Innovations* increased by 43% as compared to 2016. We have also increased the number of published papers in 2018 by about 10%. At the same time, in our effort to improve quality of publications and the impact of the journal, we reduced the acceptance rate to below 50%. Additionally, we have continued to make the journal more diversified as reflected by the content of this issue.

In this combined issue, the last one of 2018, we offer two invited feature articles, two innovations letters and eight original research articles. In the first invited article, Darmanin *et al*. provide a very comprehensive review on the superhydrophobic, superoleophobic and underwater superoleophobic conducting polymer films, from fundamental wetting theories to materials inspired by nature.[3] Conducting polymers offer unique optoelectronic properties making them attractive materials in optical devices, sensors and oil/water separation membranes. This review offers critique from the authors about conducting polymer films, their structure–property relationships, together with an outlook on the future study of this research field. The review contains impressive colorful and artistic figures and should be a good reference for all researchers working on surfaces and coatings of controlled wettability, and to many other readers in the fields of materials, chemistry, nanotechnology and energy and environment.

The second invited article was prepared by Barzegar and Tudu and reports the recent experimental and theoretical advances made in the area of gas sensors using two-dimensional (2D) materials such as graphene, MoS_2, WS_2, SnS_2, black phosphorous and others.[4] The sensing properties of 2D materials and working principles of gas sensors, together with the challenges in fabrication of the ultrasensitive gas sensors that are selective and stable, are discussed. The authors effectively categorize available 2D sensors into six different groups and review all experimental and computational works performed worldwide. This comprehensive review will further stimulate investigation on the development of novel gas sensors using advanced materials that are highly desired due to their potential for multiple applications in the field of national and personal security, health, environmental protection, clean energy and many others.

In a short letter, Legchenkova *et al*. demonstrate control over movement of soap and glycerol bubbles floating on a liquid surface using a magnetic field.[5] The displacement of bubbles is caused by the Moses effect, due to the deformation of the liquid–vapor interface by the magnetic field. The authors also offer a qualitative model to describe the repulsion of soap bubbes floating on diamagnetic liquids by a steady magnetic field.

In the second letter, Bordbar-Khiabani *et al*. propose a two-step surface modification of magnesium (Mg) alloy with a plasma electrolytic oxidation process followed by deposition of a betamethasone sodium phosphate (BSP; known as an anti-inflammatory drug) layer using a dip-coating process.[6] This invention enhances the corrosion resistance of the biodegradable Mg alloy, attributed mainly to the barrier provided by the BSP layer that fills the defects and pores of the material. This appears as a possible simplified design for polymer-free anti-inflammatory drug-eluting stents.

The research team from the Russian Academy of Sciences describe a new approach for studying the distribution of organic contaminants and products of their decomposition on the surface of structural metals using mass-spectroscopy imaging (MSI).[7] The authors developed their own software to automatically register mass spectra and to obtain images of distribution of organic ions.

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By using the MSI technique, the authors monitored the nature and distribution of contaminants on metal surfaces. This study opens new opportunities in quality control of metal parts at various stages of their manufacture for the rocket and space industry, where organic fluids are used. As an example, the authors show the effectiveness of washing agents in removal of a rocket fuel component and its transformation products from the surfaces of structural materials.

The work of Li *et al*. reports synthesis of Mn_3O_4 coated γ-MnOOH magnetic nanowires using the hydrothermal method.[8] X-ray diffraction and transmission electron microscopy studies revealed that the nanowires have a core (γ-MnOOH)-shell (Mn_3O_4) structure. By using spin-canted Mn_3O_4 and helical γ-MnOOH, the researchers were able to initiate interface coupling. This way they reduced an energy barrier in reversal of magnetic moments on the interface, and generated an exchange bias behavior with shorter responsive time compared to traditional antiferromagnetic–ferromagnetic coupling-induced exchange bias systems.

Bacterial and fungal attacks ultimately degrade textiles, particularly those made of natural fibers, creating unpleasant odors in intimate and athletic clothing and reducing the appearance and lifetime of outdoor products. Antimicrobial treatments of fabric promise freshness, stain protection and an extended product life, even for heavy-duty outdoor applications. In their new contribution, Sadeghi-Kiakhani *et al*. describe the treatment of wool fabrics with TiON and TiON/Cu thin films using a magnetron sputtering technique.[9] The authors demonstrate a significant improvement in antibacterial properties of wool fabric against *Escherichia coli* with increasing Cu content in the TiON/Cu coating.

Derakhshandeh *et al*. demonstrate a deposition of diamond-like carbon (DLC) thin films on steel substrates by means of a pulsed-DC plasma enhanced chemical vapor method.[10] The surface properties of the thin films were engineered for bio-applications to protect steel implants from bio-corrosion. The effects of bias voltage and deposition pressure on the film's structure and properties were studied in detail. The authors show that in order to produce uniform and defect-free DLC coatings, both a low bias voltage and higher deposition pressure need to be applied. The DLC films with a higher amount of sp^2 structure demonstrated lower internal stresses and improved bio-corrosion resistance.

Surface modification of biomaterial was also explored by Aydogan *et al*.[11] The authors employed micro-arc oxidation of common titanium alloy Ti6Al4V in sodium phosphate and calcium acetate containing electrolyte with and without addition of silver acetate. Multilayer coatings produced were composed of carbonated hydroxyapatite and titanium oxide, with or without silver. Going through antibacterial activity tests using a *Streptococcus mutans* strain and metabolic activity in cultures of human primary osteogenic sarcoma cell line, they found enhanced antibacterial efficiency of silver-containing coatings that did not alter cell proliferation significantly.

The research team from Gdansk University of Technology in Poland used electrochemical impedance spectroscopy and atomic force microscopy to investigate the barrier properties of edible sodium caseinate based-films.[12] Incorporating propolis (used as a sealant for unwanted open spaces in a honey bee hive) into the sodium caseinate film and heating brought enhancement to barrier properties of the film. Specifically, both propolis and elevated temperature provided additional sealing to the pores of the sodium caseinate coating.

Kaur *et al*. report studies of structural, optical and electrical properties of copper phthalocyanine thin films, formed on glass substrates at different temperatures using a cost-effective, fast and reproducible drop cast method.[13] The main feature of the presented study is the good response for the sensing properties of the investigated films towards ammonia. This fact was known previously, but in this manuscript the authors have investigated these properties in detail and found the correlations between structural characteristics and optical, electric and sensing properties.

In the last paper of this issue, Gronostajski *et al*. report a technology consisting of a combination of arc welded hardfacing and gas nitriding methods, and its use in improving the durability of forging tools.[14] The authors tackle the up-to-date problem of service life of forging dies. The technology proposed is promising and could be used to increase wear resistance of the working surfaces for hot forging tools.

We hope that the diversity of research topics offered in this issue makes this collection unique and attractive to many of our readers. Please feel free to email questions, comments and suggestions on the content of this, previous and future issues to any of us.

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