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Editorial

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Editorial

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This last issue of 2022 is a special collection of review and original papers, the majority of which were invited, prepared by the Editorial Board members of *Surface Innovations* in celebration of the 10th anniversary of the journal. It offers two Invited Feature Articles, an Expert Opinion and seven Original Articles.

Due to its oxidizing, disinfecting and bleaching capabilities, hydrogen peroxide (H_2O_2) is commonly used by the paper industry, in wastewater treatment facilities, and in various household and hygiene uses. Unfortunately, the current industrial production of hydrogen peroxide is known from its shortfalls related to safety, pollution and high energy consumption. In the first Invited Feature Article, Sang *et al*.[1] take a close look into surface catalytic phenomena and current surface engineering strategies for designing highly selective and high-yield carbon (C)-based catalysts for hydrogen peroxide electrosynthesis. The authors argue that the research investment into surface engineering and understanding of the intrinsic reaction mechanism of the two-electron oxygen (O) reduction reaction could enhance the catalytic performance of carbon-based electrocatalysts and benefit industrial production. This unique prospective should attract attention not only from researchers working on synthesis of hydrogen peroxide but also the entire research community investigating catalysts.

In the second Invited Feature Article, Chambers *et al*.[2] provide a valuable and inspiring analysis of the impact of topographies on the functional properties of surfaces. The review covers the recent advances made in modern surface texturing technologies to fabricate microscale and nanoscale roughness and hierarchical features. The authors indicate that the field is very broad and that the review focuses only on certain fundamentals and applications rather than going deep into physics, chemistry and interfacial properties. Applications covered in this paper range from controlled wetting to biofouling and biomedical adhesion, and will certainly benefit a broad spectrum of scientists and researchers studying and engineering functional surfaces and coatings.

Liquid droplet depinning on textured hydrophobic and superhydrophobic surfaces is of great significance in the evolving fields of microdevices with hierarchical surfaces for energy, power and medical use. In his Expert Opinion, Jiang[3] discusses the physics of liquid droplet pinning on soft and pillared surfaces. The author analyses the way the viscoelastic properties of liquids and the rigidity of solid surfaces affect the force required to de-pin droplets. This paper introduces important research progress in the field of wetting and dewetting, and puts forward suggestions for further research, which has important reference value for future development in this field.

The electrochemical detection of adrenaline, hydrogen peroxide and adenosine by pyrolyzed carbon electrodes coated with oxidized carbon nanotubes (CNTs) is the focus of original research carried out by an international team of researchers from Germany and the Netherlands.[4] In their exciting innovative engineering design, the authors report that CNTs, when used as electrode materials, have electron transfer kinetics faster than graphite, are resistant to biofouling and are able to discriminate between analytes by shifting the voltages. This exploratory work demonstrates a new advanced use of CNTs that could benefit multimodal electrochemical detection systems in sensing analytes.

Contact angle measurements using a sessile-drop method are well recognized and commonly used these days. However, the commonly used fitting methods for profiling drops and extracting contact angle values are not perfect, especially in the case of non-symmetrical drops. In a new report, Papakonstantinou *et al*.[5] offer a new ellipse-fitting method capable of profiling a drop that appears as an ellipse and has major and minor axes, which are not always parallel and normal with the substrate. This new fitting method also does not need a clear view of the baseline in finding the contact angle.

The measurement of contact angles on powder materials is often a challenging task, and the thin-layer wicking method is usually the best option for fine powders. In a new contribution from Maria Curie-Skłodowska University, Szcześ *et al*.[6] report a difference in water penetration into a porous layer of silica gel after water is treated by a magnetic field. Analyzing surface free energy components, including non-polar Lifshitz–van der Waals and polar Lewis acid–base interactions, the authors speculate that the magnetic field restores the network of hydrogen (H) bonds in water that is destroyed by dynamics of flow.

In the next original contribution, Feng *et al*.[7] describe the use of nickel (Ni) nanoparticles in modification of copper (Cu) nanowires as electrocatalyst for water purification via the nitrate (NO^{3-}) reduction reaction. The results showed that the nickel;

nanoparticles facilitate electron transfer from nickel to copper and enhance the removal of nitrates. The modified copper-based catalyst represents a new way of purifying contaminated water with minimal impact on the environment. This novelty should motivate other laboratories to explore this new technology in purification of water.

Della Volpe *et al.*[8] offer a new look into studies on friction of ski-warming surfaces and snow. The authors designed a wood–copper film device equipped with electronic heating to accelerate sliding on ice and snow. They found that even small temperature increases at the ski bottom can significantly reduce the friction coefficient at low speeds. The authors speculate that this positive effect is the result of modification of the quasi-liquid layer formed on the snow surface at temperatures higher than −30°C. This interesting research report might stipulate new designs in skis, sleds and other winter activity machines for any parts that slide over the snow and ice.

In another original contribution, Demirbüken *et al.*[9] report on measuring adsorption of three blood proteins, including albumin, immunoglobulin G and fibrinogen, on histidine- and leucine-terminated surfaces prepared by covalent attachment on silicon dioxide (SiO_2) substrates via a (3-aminopropyl) triethoxysilane linker. The authors used a quartz crystal microbalance, an in situ real-time monitoring technique, for measuring protein adsorption kinetics from solutions of different concentrations. The authors argue that adsorption of these three proteins is a major issue for the rational design and application of biomaterials, determining their hemocompatibility and propensity of cell adhesion, for tissue engineering applications. This study is additional evidence that adsorption of proteins on implant materials can be manipulated through well-designed surface chemistry.

In the final contribution to this special issue, researchers from the University of Utah[10] present a study on the spatially resolved imaging of hydrogel stiffness during enzymatic degradation. Using the force–volume atomic force microscopy (AFM) technique, the authors show that enzyme degradation of hydrogels can be traced in a time- and space-resolved manner, and reveal mechanical structure that is dependent on gelation history. It is also shown that the surface erosion of hydrogel by enzymes is dependent on the local density of hydrogel domains. Use of the force–volume AFM technique in studying the dynamic effects of enzymatic degradation of hydrogels could provide a foundation for better understanding of the degradation of implanted hydrogels.

We hope that you will find the content of this special issue interesting and useful to your research projects. Please do not hesitate to email your comments and suggestions to us.

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