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Editorial

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Editorial

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We would like to share with you an announcement on one of the highest scientific achievements accomplished by two of our Editorial Advisory Board members, Mietek Jaroniec from the Department of Chemistry and Biochemistry at Kent State University (OH, USA) and Lei Jiang of the Chinese Academy of Sciences (Beijing, China). Both of them have been recently listed on Clarivate Analytics' 2017 list of Highly Cited Researchers in the world. They rank in the top 1% by citations for publications in the fields of both chemistry and materials science. The full list of scientists in the top 1% of highest citations is available on the Clarivate website.[1] Congratulations to both Mietek Jaroniec and Lei Jiang!

Our international Editorial Advisory Board is also growing and we welcome two new members: Wolf-Dieter Müller from Charité – Universitätsmedizin Berlin (Berlin, Germany) and Jonas Weissenrieder of KTH Royal Institute of Technology (Stockholm, Sweden). Both of them are international experts in the area of corrosion science and engineering, and they will assist us in screening manuscripts related to surface and interfacial aspects of corrosion.

We open this issue with an Invited Feature Article prepared by Claudio Della Volpe and Stefano Siboni from Italy.[2] Both authors are well respected among the surface chemistry community for their strong contributions to interpretations of contact angles and wetting. In this feature article, Della Volpe and Siboni describe the Wilhelmy method used in contact angle and surface tension measurements. The authors offer a historical outlook on development of this method and modern uses with samples of different geometries. The review provides all crucial equations for correct interpretation of experimental capillary force values. It also guides readers in the proper use of measuring protocols with modern and automatic instrumentation, important for proper measurements of reliable and reproducible experimental values that are free of systematic errors. The review by Della Volpe and Siboni should benefit both new and matured users of the Wilhelmy method, as well as all research laboratories in which surface tension and contact angles are routinely measured and interpreted. It is an excellent review for future referencing. This paper should remind everyone that *Surface Innovations* leads an effort in the clarification of methodologies and terminologies related to contact angle measurement techniques and interpretation of contact angle values. Several papers were published on contact angle measurements and terminology in the past, and we invite readers to make suggestions on future submissions.

Spreading of liquid droplets on anisotropic patterns has been explored in the last few decades in an effort to restrict and manipulate directions of liquid movement and area of solid–liquid contact. It was well documented in the past that spreading of the liquid droplet favors anisotropy due to directions and continuity of either the solid pattern or the pattern of higher affinity to the spreading liquid. Sun *et al*. confirm that directional spreading of water droplets indeed takes place on rough and hydrophobic patterns made of microscopic parallel ridges and grooves.[3] However, they also demonstrate for the first time that the most stable state is associated with the maximum adhesion between the droplet and hydrophobic pattern when the droplet base is circular and apparent contact angles are identical values measured along longitudinal and transverse directions of the pattern. They conclude that the equations describing contact angles on rough and heterogeneous surfaces and derived using thermodynamics, such as the Cassie-Baxter equation, only pertain to a droplet in the most stable state, where the excess free energy is minimized.

Harvesting water in deserts – regions of droughts and low rainfall – remains a challenge and finding innovative technological solutions are sorely needed. Biomimetic surfaces based on the Namib Desert beetle have attracted the attention of scientists and engineers in the last few years. In their contribution, Wu *et al*. follow this concept and describe a novel technology for fabrication of micro-sized arrays of high- and low-affinity to water on a flexible polydimethylsiloxane (PDMS) film.[4] The authors deposited a monolayer of hydrophilic silica microspheres on the hydrophobic PDMS film and then etched it with a tetrafluoromethane (CF_4) plasma. Their invention is extremely efficient in collecting water from fog in amounts of up to $3{\cdot}7\ g/cm^2$ in one hour, and could be a low-cost practical solution for water collecting and trapping devices.

A wear-resistant coating was investigated by Tailor *et al*.[5] The authors successfully used plasma electrolytic oxidation, an electrochemical surface treatment process for producing an oxide coating composed of $TiAl_2O_5$ and α-Al_2O_3 on titanium alloy Ti–6Al–4V. They report a decrease in the coating growth rate with processing time, with formation of porosity. The growth of the coating is discussed in view of two mechanisms, including migration-diffusional and mechanism of formation of α-Al_2O_3.

Carbon-rich natural waste resources are being explored as an energy source or raw material for carbon products. In a new contribution, Hou *et al*. show that waste loofah can be carbonized via a facile pyrolysis in the inert atmosphere and converted to carbon powder with nearly 500 m^2/g specific surface area.[6] This new waste loofah-derived carbon appears to be a very promising material for lithium ion battery anode application due to its high electrochemical lithium-storage activity, reversible discharge capacity and good cycling stability. It is hypothesized that a high surface area and structural defects induced by residual oxygen-containing groups are responsible for the surprisingly good electrochemical performance of this carbon.

Diamond-like carbon (DLC) displays properties similar to diamond and is commonly used in coatings of metals to reduce abrasive wear and friction, and increase the lifetime of products such as shaving and cutting blades, drill bits and a variety of machining and molding tools. The low friction, reduced wear, good electrical properties and corrosion resistance of DLC coatings also make them appealing for medical applications. Derakhshandeh *et al*. investigated the effects of bias voltage and deposition pressure in a pulsed-direct current (DC) plasma-enhanced chemical vapor deposition (PE-CVD) system on the structure and properties of the DLC coatings on stainless steel substrates.[7] The results reveal a positive effect of increasing bias voltage and a negative effect of increasing pressure on formation of sp^3 hybridized carbon (diamond-like) atoms over the sp^2 bonded carbons (graphite-like) in coatings. These operational variables also influenced internal stresses in the DLC coatings, which increased an order of magnitude for coatings produced with increasing bias voltage in this study. In summary, the authors demonstrate that with a precise control over the bias voltage and deposition pressure in the pulsed-DC PE-CVD system, an optimum sp^3 content and internal stress value of the DLC film can be achieved.

We hope that the variety 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.

REFERENCES

1. Clarivate Analytics (2017) *2017 Highly Cited Researchers*. See https://clarivate.com/hcr/2017-researchers-list/ (accessed 26/02/2018).
2. Della Volpe C and Siboni S (2018) The Wilhelmy method: a critical and practical review. *Surface Innovations* **6(3)**: 120–132, https://doi.org/10.1680/jsuin.17.00059.
3. Sun Y, Jiang Y, Choi CH *et al.* (2018) The most stable state of a droplet on anisotropic patterns: support for a missing link. *Surface Innovations* **6(3)**: 133–140, https://doi.org/10.1680/jsuin.17.00064.
4. Wu Y, Li H, Wen L *et al.* (2018) Bionic PDMS film with hybrid superhydrophilic/superhydrophobic arrays for water harvest. *Surface Innovations* **6(3)**: 141–149, https://doi.org/10.1680/jsuin.17.00063.
5. Tailor S, Rakoch AG, Gladkova AA *et al.* (2018) Kinetic features of wear-resistant coating growth by plasma electrolytic oxidation. *Surface Innovations* **6(3)**: 150–158, https://doi.org/10.1680/jsuin.17.00054.
6. Hou H, Yu C, Liu X *et al.* (2018) Waste-loofah-derived carbon micro/nanoparticles for lithium ion battery anode. *Surface Innovations* **6(3)**: 159–166, https://doi.org/10.1680/jsuin.17.00068.
7. Derakhshandeh SMR, Eshraghi MJ, Hadavi SMM *et al.* (2018) Diamond-like carbon thin films prepared by pulsed-DC PE-CVD for biomedical applications. *Surface Innovations* **6(3)**: 167–175, https://doi.org/10.1680/jsuin.17.00069.