

Engineering for surface performance

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The nature of the bulk dictates material properties, such as density, strength, elasticity, ductility, heat capacity and magnetic susceptibility, whereas materials' interactions with surroundings are driven by surface characteristics including wettability, adhesion, biocompatibility, antifouling, printability, corrosion resistance, wear resistance and frictional behavior. Most of the time, the ideal surface properties for a particular application cannot be found in a single material without additional processing. If this is the case, material surface requires either processing (physical and/or chemical) or coating (with a molecular layer, thin film or structural coating) to impart desirable surface performance. *Surface Innovations* promotes the release of research results and discussion on both innovative and traditional techniques used in material surface modifications and characterizations.

After successful deployment of the first two issues of our new journal, the authors offer this third issue that compiles research and review articles on surface engineering. Most of these articles that appear in this issue were received from invited authors. Our feature review article is on functionalization of cotton fibers and fabrics and was prepared by Dr. Barbara Cortese (ISMN CNR Institute for the Study of Nanostructured Materials, Roma, Italy) and her colleagues. Dr. Cortese's review summarizes recent developments in manipulation of cotton fiber's surface wettability, fabrication of smart textiles (temperature responsive, pH responsive, UV responsive, solvent responsive, antibacterial and for oil/water separation) and manufacturing the flame-retardant textiles. The reader should find this review timely, with a unique and broad analysis of literature on surface modifications of cotton published in the last few years.

Contributions on superhydrophobic surfaces and coatings dominate the content of the *Surface Innovations* journal so far. In addition, in this issue, we have two invited contributions on this topic. Dr. Ludmila Boinovich *et al.* from Russian Academy of Sciences, in their original research article, reveal the process of manufacturing a composite superhydrophobic coating on a Mg–Mn–Ce alloy. The process involves bipolar plasma electrolytic oxidation and attachment of hydrophobic molecular layer. The research results presented by Boinovich *et al.* demonstrate protective anticorrosion properties and long-term durability of this novel coating, which most likely has application for a variety of Mg-based alloys.

Dip-coating process involving a colloidal suspension of silica nanoparticles was used by Dr. Ravi Kumar and his students from IIT Madras in India to produce coatings of controlled wettability. The novelty here is the use of dual-sized silica particles. Manipulation of sizes of nanoparticles and their fractions in colloidal suspensions allowed researchers from India to produce coatings with superhydrophobic characteristics.

Additional contribution on a silica-based coating of controlled wettability included in this issue was submitted by the research group from Shivaji University. Gurav *et al.* demonstrate the application of the sol-gel method in fabrication of water-repellant silica-microbowl structures additionally modified with silanes. Although superhydrophobicity was not reached for these structures yet, a water contact angle as high as 136° and a sliding angle of 18° are reported in this communication.

In another invited article, a research team from the Duke University led by Dr. Appala Raju Badireddy, in collaboration with the University of Houston, discloses their invention of new lipophilic bismuth-dimercaptopropanol nanoparticles. These new nanoparticles, with a size of 18 nm, demonstrate antibacterial and antifouling properties. A colloidal solution of the bismuth-dimercaptopropanol nanoparticles has the potential to be used as a treatment and coating agents to reduce attachment of bacteria, inhibit their growth and damage established biofilms.

Finally, Dr. Phuc Nguyen and his colleagues from the University of Adelaide, Australia, describe the slurry-spray technique for the thermal barrier coatings. This newly introduced technique has the potential to revolutionize the coating manufacturing industry due to its simplicity, low-operational cost and suitability for coating large and curved surface areas.

This issue could not have materialized without the contributions from the invited authors of included articles, the time and effort that reviewers have dedicated to the manuscripts during the review process and help received from the publisher. I would like to thank them all!

I am looking forward for your feedback on the content of this issue as well as other issues of *Surface Innovations*, all of which

are available free of charge in 2013. We will continue our effort to make every upcoming issue of *Surface Innovations* appealing to our readers. We also strongly encourage every research group around the world working on cutting edge surface-related research

to consider publishing research and review articles in our journal. Comments and suggestions regarding the content and frequency of publication of *Surface Innovations* are also welcome and will receive serious consideration.