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Characterization of the Extreme Hydrophilic & Oleophobic Behaviors of Bioengineered Ultrapure Nan cellulosic Gels

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Abstract:

The development of an innovative interfacial wetting strategy known as liquid infused systems offers great promise for design of super-wetting and super-ant wetting substrates that overcome the drawbacks of textured surfaces classified as Cassie/Wenzel states. The value of such nature-inspired surfaces can address practical scientific and technological challenges within interfacial chemistry such as ease of manufacture, separation efficiency, recharge ability, anti-fouling, and robustness. For example, we demonstrate that nanocellulose fibers from bacteria can form a high-performance three-dimensional cross linked network confining a dispersed liquid medium such as water that leads to interfacial engineering marvels. More specifically, the strong chemical and physical interactions between dispersed water molecules and entangled cellulosic network endow these substrates with effective liquid separation capabilities.

Biography:

Dr. Lucian A. Lucia currently serves as an Associate Professor in the Departments of Forest Biomaterials (Wood & Paper Science) and Chemistry and as a faculty in the programs of Fiber & Polymer Science and Environmental Sciences at North Carolina State University. His laboratory, The Laboratory of Soft Materials & Green Chemistry, probes fundamental materials science topics focused on the green chemistry of renewable polymers. He received his Ph.D. in organic chemistry from the University of Florida for modeling photo induced charge separation states of novel Rhenium (I)-based organ metallic ensembles as a first order approximation of photosynthesis.

Speaker Publications:

1. "Insights into the Potential of Hardwood Kraft Lignin to Be a Green Platform Material for Emergence of the Biorefinery" Polymers/2020/ 12(8):1795-1820

2. "Enhancement of Lignin Extraction of Poplar by Treatment of Deep Eutectic Solvent with Low Halogen Content" Polymers/ 2020/ 12(7):1599

3. "Structural reconstruction strategies for the design of cellulose nanomaterials and aligned wood cellulose-based functional materials – A review" Carbohydrate Polymers / 2020/ 247:116722.

4. "Ultra-efficient photo-triggerable healing and shape-memory nanocomposite materials doped with copper sulfide nanoparticles"Composites Science and Technology/ 2020/ 199:108371

5. "3D Photoinduced Spatiotemporal Resolution of Cellulose-Based Hydrogels for Fabrication of Biomedical Devices" ACS Applied Bio Materials/ 2020/ 3(8):5007-5019

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