MSE SEMINAR

Materials Science and Engineering
Michigan Technological University

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Contact Angles on Rough Surfaces Including Superhydrophobic and Superhydrophilic Surfaces

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Abstract

Research on surfaces and coatings with controlled wetting characteristics has exploded in the last decade, especially soon after new terms such as *superhydrophobicity* and *superhydrophilicity* were introduced in 1996 and 2000, respectively. These new terms are used to describe exceptionally weak and strong, respectively, interactions of materials and coatings with bulk water, controlled entirely by surface topography and material chemistry. Although manipulation of surface characteristics is nothing new, and was explored by mineral processing and textile industries several decades ago, the renewed interest in surfaces/coatings of controlled wettability is driven by an emerging market for water-repellant, snow- and ice-phobic products and formulations, water anti-fogging screens, windows and lenses, anti-fouling coatings, microfluidic devices, coatings for enhanced boiling heat transfer, foils for food packaging, and many others. In this presentation, the physics behind wetting phenomena on rough surfaces, including superhydrophobic and superhydrophilic effects, will be briefly reviewed, along with contrasting cases illustrating common misconceptions and misunderstandings. Several applications of superhydrophobic and superhydrophilic surfaces and coatings, including examples from the authors' own research, will be presented.

Bio: Dr. Jaroslaw W. Drelich received his MS degree in chemical technology from the Technical University of Gdansk (TUG), Poland, in 1983, and his Ph.D. degree in metallurgical engineering from the University of Utah in 1993. He came to Michigan Tech in 1997 and currently is a professor of materials science and engineering. His main research interests are in applied surface chemistry and interfacial engineering for ore dressing and materials processing, nanotechnology, materials recycling, characterization of materials' surfaces, and formulation of antimicrobial materials and biomaterials. Aside from teaching several courses on characterization and processing of materials at Michigan Tech, Dr. Drelich has edited 6 books, published more than 160 technical papers (cited nearly 3,000 times according to Google Scholar), holds 9 patents and has more than 50 conference presentations, including several keynote addresses, to his credit. Additionally, Dr. Drelich is the Editor-in-Chief for the *Surface Innovations* journal. He is the active member of The Minerals, Metals, and Materials Society (TMS), Society for Mining, Metallurgy and Exploration (SME), and American Chemical Society (ACS), and has served on a number of different committees; currently, he serves as Chair for the TMS Energy Committee.

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