



**Single-step fabrication of fluorine-free
superhydrophobic substrates for biochip and
industrial applications**

Dr. Hua-Zhong "Hogan" Yu/Simon Fraser University

Thursday, April 06, 2023, 2:30pm

Dupuis Hall, Room 215

Superhydrophobic coatings have been developed to warrant waterproof properties of synthetic materials for diverse applications, such as outdoor clothing, construction materials, and μ PAD (microfluidic paper-based analytical devices). Our early research showed that off-the-shelf laboratory filter paper (both cellulose filter paper and glass microfiber filters) can be treated into superhydrophobic with a binary solution of short- and long-chain organosilanes. The modified filter paper can be readily patterned with UV/ozone treatment to create hydrophilic regions for colorimetric / fluorometric assays of various analytes. Recently, we have discovered that OTS (octadecyltrichlorosilane) stoichiometrically hydrolyzes and condensates to micro-to-nanoscale hierarchical siloxane aggregates dispersible in industrial solvents, which can be applied to all different solid substrates (paper, cotton fabric, wood, and metal). Such superhydrophobic coatings exhibited superior performance in cost, scalability, robustness, and particularly the capability of encapsulating other functional materials. The unconventional silanization reactions to create fluorine-free superhydrophobic surfaces are beyond the sole purpose of biochip applications and can be extended to develop marketable daily products with complete waterproofing properties.