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Liquid Slippage over a Hydrophobic Surface: The Effect of Nanobubbles and Nanoroughness.

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Micro and nanofluidic devices for manipulating fluids are widespread and are finding uses in many scientific and industrial contexts. Their design and small length scale introduce new research questions and themes to consider, first of all the impact of surface phenomena in controlling the flow. The present talk focuses on the combined effect of roughness and (partial) wettability on the flow, the circumstances that lead to interesting modification of old hydrodynamic problems and new flow responses. New high-precision quantitative methods based on confocal and atomic force microscopy - double focus confocal fluorescence cross correlation and thin film drainage measurements - are detailed. Also covered is the design of the model surfaces with the controlled nanoroughness and wetting properties. A discussion of the theoretical models suggested for a description of experimental configurations is given. Special emphasis is given to the analysis of experimental data. This covers the formation and role of nanobubbles, a contribution from surface forces into accelerating the flow, an interplay between nanoroughness and slippage, and more.