Hydrophobic agent adsorption dynamics of laser textured superhydrophobic metallic surfaces

James Macdonald[1], Ainara Rodriguez[2], Ronan Daly[1]

1- Institute for Manufacturing, University of Cambridge, 17 Charles Babbage Rd, Cambridge CB3 0FS
2- Ceit-IK4, University of Navarra, 20018 *San Sebastián, Spain*

Corresponding author: jsm85@cam.ac.uk

Laser texturing of metals has been shown to produce superhydrophobicity through induced surface texture and chemistry modifications [1,2]. So far, industrial applications using this approach have been hampered by a lack of comparative studies into the optimal laser structuring approach. This study aims to provide a nuanced explanation of the chemical transition between highly wetting and non-wetting hydrophobicity after laser processing using nano- and femto- second lasers. This time-consuming transition process is linked to the adsorption of volatile organic compounds present in air. The nature of the transition is informed by exposing the laser textured surfaces to environments of hydrocarbons with known terminal groups and chain lengths. Surface structure, chemistry and wettability are characterized to inform the mechanism of the surface wetting transition.

1. Comparison of nano- and femto-second laser structured surface morphology and wetting properties
2. Gas adsorption dynamics of volatile organics with different functional groups
3. Exploring influence of chain length on hydrophobic properties
4. Durability testing of modification approaches

[1] James Macdonald, Ronan Daly. Taming the chemical transition of laser processed superhydrophobic surfaces and exploration of digital wettability contrast patterning, , Univ. of Cambridge (United Kingdom). . . . .[10906-58] SPIE Photonics West 2019
[2] M. Martínez-Calderon, A. Rodríguez et al. Femtosecond laser fabrication of highly hydrophobic stainless steel surface with hierarchical structures fabricated by combining ordered microstructures and LIPSS. Applied Surface Science 374 (2016) 81–89