

Biomimetic surfaces exhibiting extreme wettability properties for tissue engineering applications.

João F. Mano ^{1,2}

¹3B's Research Group – Biomaterials, Biodegradables and Biomimetics, University of Minho, Headquarters of the European Institute of Excellence on Tissue Engineering and Regenerative Medicine, AvePark, 4806-909 Taipas, Guimarães, Portugal

²ICVS/3B's –PT Government Associate Laboratory, Braga/Guimarães, Portugal.

Surfaces exhibiting hierarchical topographic organization, from the nano to the micro scale, may present extreme wettability properties, ranging from (lotus-like) superhydrophobic to superhydrophilic behaviour. Such surfaces may be used as innovative substrates to infer cell behaviour and protein adsorption onto surfaces beyond the conventional hydrophobic-to-hydrophilic character. We proposed a rapid procedure to produce superhydrophobic substrates in polymeric films that could change the wettability up to contact angles near zero through further modification using plasma or UV/ozone radiation. By spatially control the regions of surface modification it is possible to produce surfaces with gradients in wettability or pattern wettable areas surrounded by superhydrophobic spaces. We have been suggesting the use of such devices for ex-vivo biomedical applications, such as platforms for combinatory analysis of 2D or 3D biomaterials and cells, including miniaturised hydrogels and scaffolds with multiple combinations of compositions and properties, and also to produce open microfluidic devices. The developed superhydrophobic substrates may be also used to process polymeric particles in mild conditions and with unique structural characteristics, specially designed for tissue engineering applications