Luminescent Superhydrophobic surfaces for anti-microbial adhesion and anti-biofilm applications

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The control in surface hydrophobicity and water adhesion is extremely important for anti-microbial adhesion or anti-biofilms properties. For the first time we will show that the use of fluorescent monomers such as Pyrene with various substituents differing by their hydrophobicity, size or rigidity/flexibility can lead to surfaces with tunable hydrophobicity, water adhesion and fluorescence properties by a direct electropolymerization process.[1]

Seven original monomers with fluoroalkyl, alkyl, phenyl, adamantly and triethyleneglycol substituents were synthesized and studied. The surface roughness is highly dependent on the substituent and it seems that the fluorescence signal correlates well with the surface roughness. Superhydrophobic properties and highly oleophobic properties are obtained using fluoroalkyl chains due to the presence of nanostructured microparticles Fig.1. In comparison to the structured absorption and emission bands of Pyrene monomers, the Pyrene polymers exhibit a broad structureless spectral shape, where the loss of vibronic structure arises from the Pyrene oligomerization and loss of aromatic Pyrene core structure.

This work is a first tentative to combine superhydrophobic and fluorescent properties using an innovative strategy.

In order to investigate and demonstrate that such superhydrophobic and oleophobic surfaces have anti-microbial adhesion and anti-biofilms properties, results on two pathogenic bacteria (S. Aureus, P. Aeruginosa) will be presented.

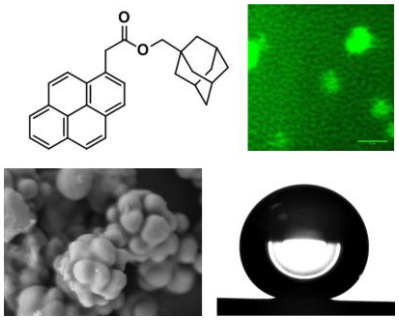

Figure 1 Example of pyrene monomer - Fluorescent surface - Roughness- Superhydrophobicity

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References:

[1] G. Ramos Chagas, X. Xie, T. Darmanin, K. Steenkeste, A. Gaucher, D. Prim, R. Méallet-Renault, G. Godeau, S. Amigoni, F. Guittard, *J. Phys. Chem. C*, **2016**, 120 (13), 7077