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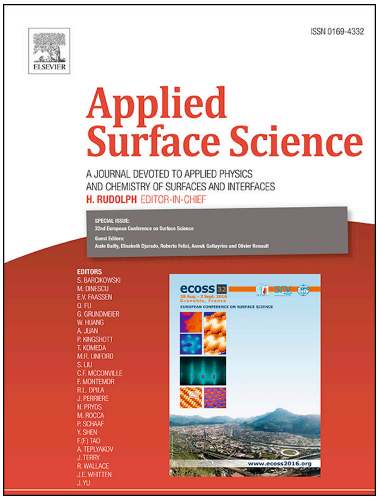

PII: S0169-4332(18)30758-X
DOI: https://doi.org/10.1016/j.apsusc.2018.03.088
Reference: APSUSC 38836

To appear in: *Applied Surface Science*

Received Date: 16 November 2017
Revised Date: 2 March 2018
Accepted Date: 11 March 2018

Please cite this article as: M. Sánchez-Molina, A. Díaz, M. Valpuesta, R. Contreras-Cáceres, J. Manuel López-Romero, M. Rosa López-Ramírez, Tripodal penta(*p*-phenylene) for the biofunctionalization of alkynyl-modified silicon surfaces, *Applied Surface Science* (2018), doi: https://doi.org/10.1016/j.apsusc.2018.03.088

Tripodal penta(*p*-phenylene) for the biofunctionalization of alkynyl-modified silicon surfaces

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Abstract

Here we report the optimization on the covalent grafting methodology of a tripod-shaped penta(*p*-phenylene), **1**, on alkynyl-terminated silicon surfaces, and the incorporation of an active theophylline derivative, **2**, for the specific immobilization of proteins. The tripodal molecule presents azide-terminal groups to be attached onto a silicon surface containing an alkynyl monolayer. Initially, compound **1** has been covalently incorporated on alkynyl-terminated Si wafers, by the copper catalyzed alkyne-azide 1,3-dipolar cycloaddition (CuAAC, a click reaction). The tripod density on the silicon surface is tuned by performing the CuAAC reaction at different concentrations of **1**, as well as under different experimental conditions (T, base, copper source, shaking). Then, tripod **1**-modified surface has also been biofunctionalized with **2**. The effective preparation of this silicon-modified surface allowed us to study the streptavidin immobilization on the surface. Characterization of the different surfaces has been carried out by X-Ray Photoelectron Spectroscopy (XPS), Atomic Force Microscopy (AFM) and Bright-Field Optical Transmission Microscopy (Confocal) techniques. We also include density functional theory (DFT) analysis of the organic structures to confirm the height-profile and the tripod-surface relative configuration extracted from AFM images.

Keywords: tripodal phenylene; silicon surface; click reaction; nanostructuration; theophylline; bifunctionalization