Vesicle bio-adhesion as a new quantitative tool for monitoring photo-oxidation processes in lipid membranes

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Cell-adhesion events proceed by the formation of adhesive patches, taking advantage of ligand–receptor bonds. The formation of such adhesive zones has been explored in biomimetic systems by monitoring vesicles of phospholipid bilayers with known amounts of ligands, as they adhere on substrates with chosen densities of the corresponding receptors.[1] In this work, the adhesion of biotinylated giant unilamellar vesicles (GUVs) onto streptavidin functionalized substrates was analyzed under a photo-oxidative stress. For this, different concentrations of erythrosin photosensitizer were added in the outer medium of DOPC adhered vesicles. Figure 1 shows a schematic representation of streptavidin molecularly-designed surfaces, biotinylated GUVs and the three-step sequence of the bio-adhesion method. In this geometry, where the photo-oxidation process takes place under green (λ = 547 nm) irradiation, the surface area increase of membrane can be directly extracted from changes in the adhesion state of the vesicle. A full peroxidation of the lipids was achieved and a quantitative determination of the surface area increase could be made. A relative increase of surface area of ca. 19% was measured for DOPC bilayers, in agreement with other methods.[2]

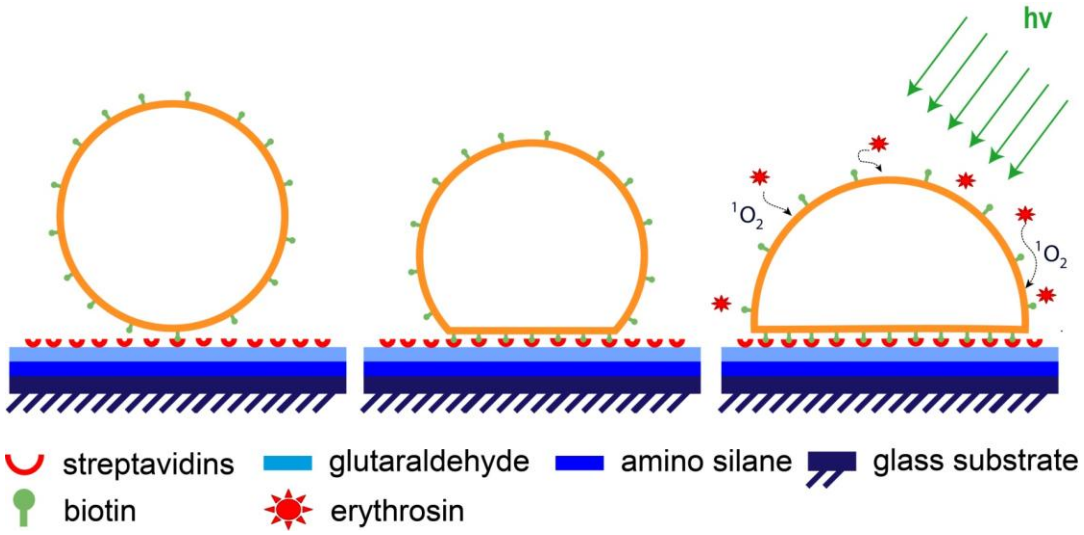

Figure 1: schematic representation of streptavidin molecularly-designed surfaces, biotinylated GUVs and the three-step sequence of the bio-adhesion method.

1. M.-L. Hisette, P. Haddad, T. Gisler, C. M. Marques and A. P. Schroeder, *Soft Matter*, 2008, **4**, 828-832.
2. K. A. Riske, T. P. Sudbrack, N. L. Archilha, A. F. Uchoa, A. P. Schroder, C. M. Marques, M. S. Baptista and R. Itri, *Biophysical Journal*, 2009, **97**, 1362-1370.