

Physics Department

## Adsorption of liposomes on PEMs

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(CEFITEC)  
Functional Molecular Systems (FMS) (Line 5)

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Born in 1980 at Marinha Grande. In 2003 finished her Biology graduate at FCT Coimbra University and pursued an educational career. In 2009 started her PhD in Biomedical Engineering at FCT/UNL.

## Objectives

Characterization of physical-chemical features of surfaces and interfaces of macromolecules composed by self-organized organic molecular structures in order to create molecular electrical, optical, photonics and sensing devices.

Development and characterization of biological functional molecular heterostructures, obtained from polyelectrolytes and biological molecules (lipids and proteins), aiming understand the structure and functions of biomembranes and enabling advances e.g. in drug delivery.

Characterization of liposomes suspensions adsorption onto solid support polyelectrolytes multilayers (PEM) with high and low roughnesses allowing to differentiate between intact and disrupted liposomes.

## Methodology

PEMs assembly onto solid supports are prepared using the Layer-by-Layer (LbL) technique (see Fig. 1).

The size of the liposomes suspensions is measured using Dynamic light scattering (DLS).

The mass adsorption amount of the liposomes is obtained by quartz crystal microbalance (QCM).

To obtain information of the final state of the liposomes, topographic images of the PEMs and PEMs/liposomes are performed by atomic force microscopy (AFM).

## Expected Results

Liposomes adsorbed amount values close to 5 milligram per unit area suggests that a planar lipid bilayer was formed (see Fig. 2 a)) while high adsorbed amounts signify that intact liposomes were adsorbed (see Fig. 2 b)).

Liposomes adsorption kinetic parameters calculated from adsorption kinetics curves, allow us to conclude that the adsorption process is due to electrostatic interactions and also depends on processes such as diffusion and re-organization of lipids on surface.

Analysis of the AFM statistical parameters enable to calculate growth exponents and fractal dimensions follow the Villain self-affine and Itoh models, respectively.

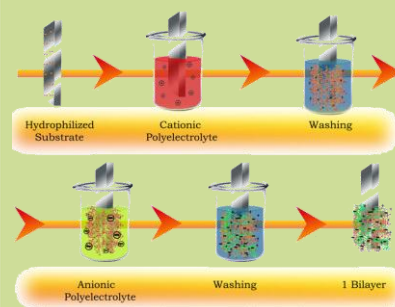


Fig. 1 – LbL technique

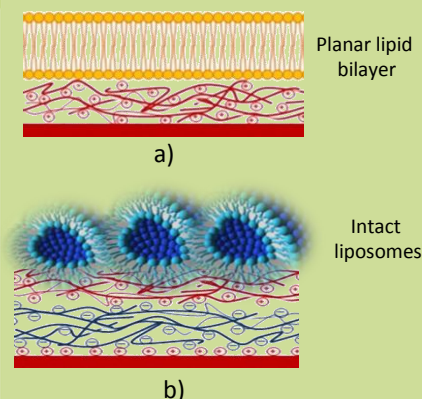


Fig. 2 – Proposal models.