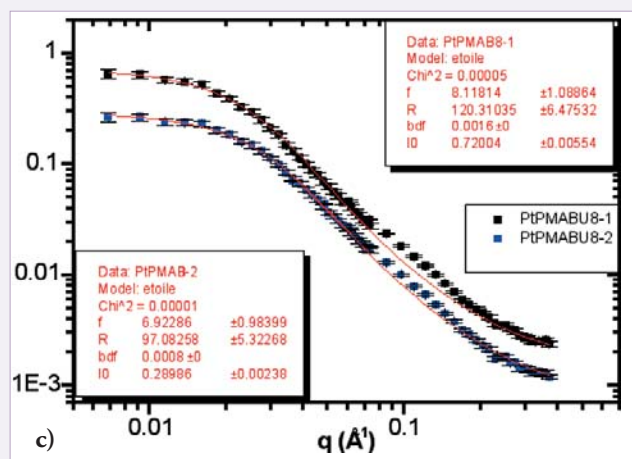
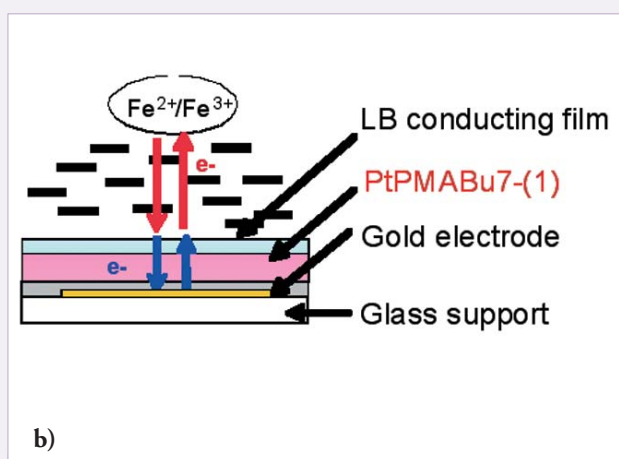
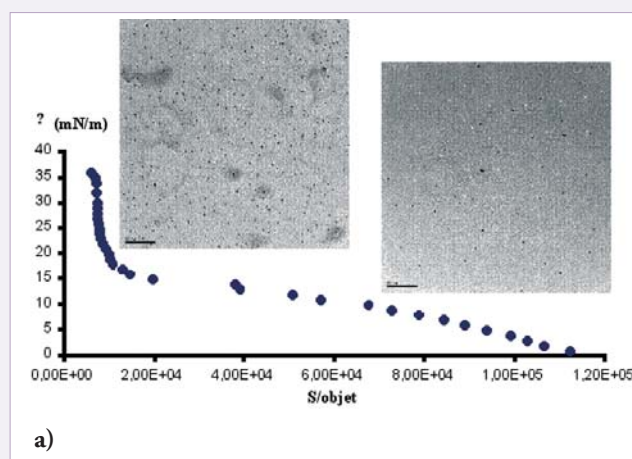


[C1. G. Carrot] Self-assembling via Langmuir-Blodgett films and SANS characterisation of polymer-grafted platinum nanoparticles : a possible application in fuel cells.

We synthesized platinum nanoparticles possessing electrocatalytic properties which are used as catalyst in the reduction of oxygen in fuel cells. The study of their electrical and electrochemical properties is performed after deposition on gold electrodes via Langmuir-Blodgett (LB) films. To improve the dispersion of the particles in the LB film as well as the deposition step, we grafted polymer chains onto the platinum



nanoparticles. Well-dispersed LB films can be obtained directly from the polymer-grafted-particles solution and the distance between particles may be adjusted depending on the degree of compression (Figure 1a). We are currently conducting electrical and electrochemical measurements onto these materials and the transfer onto gold electrodes can be done without the presence of fatty acid (Figure 1b). SANS spectra of two polymer-grafted nanoparticles with different molecular weights but the same grafting density are shown in Figure 1c (particle matching). First they show a plateau at small q which attests that the objects are individual and well-dispersed. We used a model of polymer star (chains connected together to a very small core) to fit the form factor. This model permitted us to determine both the number of chains (between 5 and 8, depending on the polymerisation batch), the radius of gyration of the polymer corona and the chain molecular weight.

[Collaboration : G. Carrot, LLB, H. Perez, SPAM, CEA-Saclay]

Figure 1: (a) Compression isotherm from polymer-grafted platinum nanoparticles and corresponding TEM images at different degrees of compression (surface pressure, $P=2$ mN/m (left image); $P=26$ mN/m (right image)) (b) Configuration scheme for electrochemical measurements (c) Neutron scattering spectra obtained from the grafted polymer chains at two different polymerisation time (particle matching): fit with a polymer star mode (particle matching).

[C2. K. Lagréné] Dynamics of a polymer confined in macroscopically monodisperse oriented pores.

Thanks to numerous theoretical developments spanned over few decades, it is now possible to draw a close relationship between polymer rheology in the bulk and polymer dynamics at the molecular level. Nevertheless, numerous technical applications are a step forward of the theoretical developments and already take advantage of the peculiar properties of polymers in interfacial situations or deep confinement. In the scope of my thesis work, we focus on the influence of confinement on hydrogenated polyethylene oxide (^hPEO) with high molecular mass 100 000 g/mol (the critical entanglement mass ($M_C = 3600$)). As confining material, we use Anodic Aluminium Oxide (AAO) membranes. AAO are a class of materials showing an extremely well defined and anisotropic porous structure made of macroscopically aligned micrometers long cylinders with nanometre size diameter (Fig. 1). The isotropic "average out" of the dynamical information occurring in non-oriented systems can then be overcome by proper orientation of the AAO pores axe relative to the beam. The topology is described by the pore