

# Experimental report

26/03/2017

**Proposal:** TEST-2590

**Council:** 4/2016

**Title:** Coupled Dynamics of Membranes in Multilamellar Vesicles

**Research area:**

**This proposal is a new proposal**

**Main proposer:** Leonardo CHIAPPISI

**Experimental team:**

**Local contacts:** Ingo HOFFMANN

**Samples:** D2O  
Chitosan  
RO90

Instrument	Requested days	Allocated days	From	To
IN15	3	3	27/08/2016	30/08/2016

**Abstract:**

# Experimental Report for: Exp. Test 2590

March 13, 2017

We investigated the membrane dynamics of polyelectrolyte mediated multilamellar vesicles consisting of the anionic surfactant RO90 and the polycation chitosan. While the structure of the individual layers is constant the number of layers increases as the fraction of chitosan increases. The experiment was aimed at answering the question whether this growth in the average membrane thickness would be reflected in a change of the membrane rigidity after previous NSE experiments on similar systems showed no change. In contrast to the previous experiment, where flexible polyacrylic acid was used as polyelectrolyte, we used intrinsically stiff chitosan. Neutron spin-echo (NSE) measurements were performed at IN15 and using the Zilman-Granek model ( $S(q,t) = \exp(-(\Gamma_{ZG} q^3 t)^{2/3})$ ), where the membrane rigidity  $\kappa \propto \Gamma_{ZG}^{-2}$  it can be seen that membrane rigidity increases, indeed (see fig. 1). From these measurements we can conclude that the membrane dynamics in polyelectrolyte mediated multilamellar vesicles with stiff polyelectrolytes change with the number of layers.

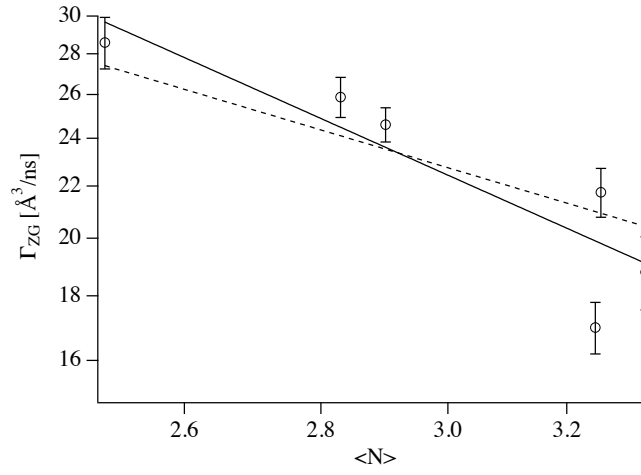


Figure 1:  $\Gamma_{ZG}$  as a function of the average number of surfactant layers in the vesicle which has been previously determined using SANS. It can be seen that  $\Gamma_{ZG}$  decreases and hence  $\kappa$  increases. Lines are fits to  $\Gamma_{ZG} \propto \langle N \rangle^{-1}$  and  $\Gamma_{ZG} \propto \langle N \rangle^{-1.5}$ , corresponding to the scaling for bilayers and homogeneous materials respectively.