# SHAKE Sample Heating And Kinons\* Experiments

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(Summer Students Program 2009)

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\*Kinons (Swedish) = Quinones (English)

# Introduction

- The lipid-based model membranes are widespread in modern studies
- SAXS can be used for study of lipid structure and phase transitions
- Investigating of the structural aspects upon interaction with guest molecules (e.g. quinones)



# **Experimental setup**



A2 @ DORIS III Small angle X-ray scattering/diffraction



Where *d* is the distance between two allowed diffraction planes

### Biological side of the lipids

#### Structure

Most membrane lipids are amphipathic, having a non-polar chain and a polar head





http://images.google.de/imgres?imgurl=http://www.bioteach.ubc.ca/Bioindustry/Inex/graphics/TypesOfLipidStructures.gif&imgrefurl=http://www.bioteac h.ubc.ca/Bio-industry/Inex/&usg=\_\_4NqlBteHqkN0v35sB1zmb2nZBc=&h=250&w=449&sz=36&hl=de&start=100&um=1&tbnid=5QaAbP7e7611 HM:&tbnh=71&tbnw=127&prev=/images%3Fq%3Dlipid%2Bstructure%26ndsp% 3D18%26hl%3Dde%26sa%3DN%26start%3D90%26um%3D1

### All our samples POPE\* + buffer + guest molecules!!!

#### POPE



http://www.avantilipids.com/index.php?option=com\_content&view= article&id=1542&Itemid=335&catnumber=110637

• Different pH

 Changing temperature from 25°C to 83°C





Table of number of samples:

	pH 3.5	pH 6	pH 7
POPE+buffer+2.6BATH	1	2	3
POPE+buffer+2.6BATQ	4	5	6
POPE+buffer	8	9	10,11

# Sample preparation

- Measuring of mass of POPE (6-8 mg)
- Calculate the ratio of components: POPE: Quinone molecules (100:1) and volume
- Dissolve them, evaporate chloroform and mix with buffer.



### MOVIE!

# Sample observation

- Most of our samples had two different fractions into the capillary :
  - the transparent part in the volume of capillary (or several white inclusions)
  - the orange or white ring on the top or deposition on the bottom



## Results for sample 4, pH 3.5 POPE+buffer+2,6 BATQ

Mass POPE : 7.57 mg Mol of POPE: 1.054·10<sup>-5</sup>mol Mol of BATQ: 1.054·10<sup>-7</sup> mol

1."Timescan"  $\rightarrow$  heating from 25°C to 83°C 2. "Orange ring"  $\rightarrow$  heating from 25°C to 83°C





Orange ring- hexagonal structure: Frame 24 S1=0,0156 [1/nm]; S2=0,027 [1/nm]; S3=0,0316 [1/nm];

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S1/S1 = 1
S2/S1 = 1.73 \sim 1.7
S3/S1 = 2.03 ~2
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10/09/2009

## Results for sample 11" orange ring"

POPE+buffer



## Conclusions

• The structure for mixture of POPE with guest molecules were determined

	pH 3.5	pH 6	pH 7
POPE+buffer+2.6BATH	1	2 or	3 or
	No structure	Q+LAM	1 ring
POPE+buffer+2.6BATQ	4 volume	5	6
	LAM->Hex	No structure	No structure
	4 or		
	Q+LAM-> Q+Hex		
POPE+buffer	8 or	9 or	10,11 or
	LAM+Q->	LAM->	Hex+Q-> Hex.
	Hex.	Hex.	

• The relation between pH and composition of the sample was discussed

#### DESY 2009



### Maria & Joanna

### Thank you for your attention!

Are there any questions?