

# Mucin thin layers on top of model membranes: a model environment for delivery

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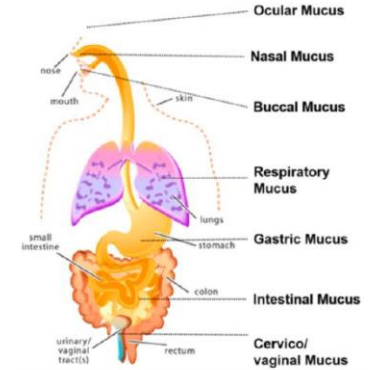
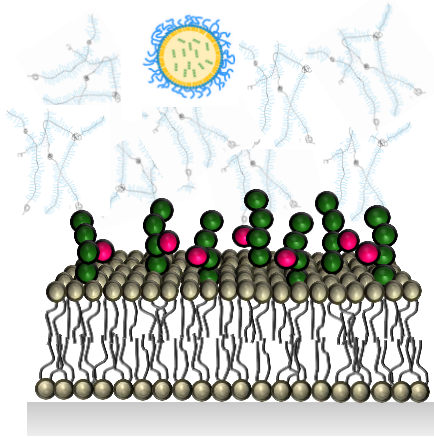
**MUCUS** highly viscoelastic secretion, covering the epithelia surfaces of the gastrointestinal, pulmonary, oral, nasal and genital tracts.

## Tasks

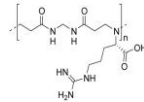
- to protect mucosal tissues from dehydration, mechanical stress
- to act as **SELECTIVE BARRIER** against microorganisms and toxic substances regulating the distribution of drugs, ions and proteins

## Structure

- water (up to 98%)
- lipids
- small proteins
- nucleic acids
- high molecular weight glycoproteins: **MUCINS** (up to 5%)



## OUR PROBE



MW= 10 kDa

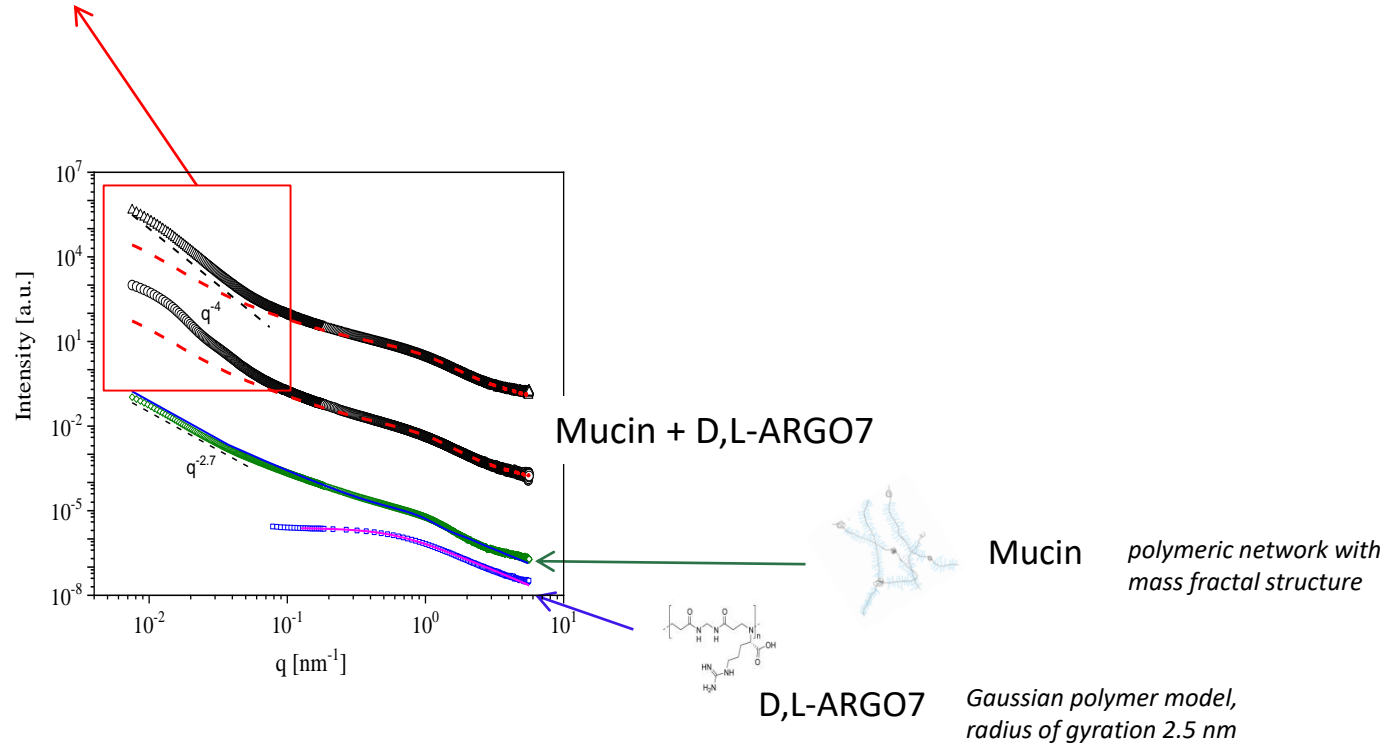
## **D,L-ARGO7**

- Water soluble polyamidoamine
- Amphoteric
- good **biocompatibility** and **biodegradability**
- promising for DNA and siRNA delivery.
- possible **protection** actions against virus infection
- **low cytotoxicity**
- Known affinity to glycolipids

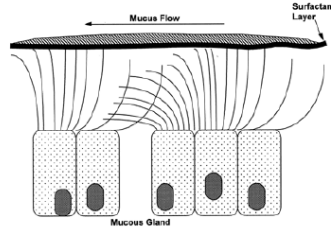
# SAXS IN BULK

@ESRF

- Cluster formation (200nm) (phase separated)
- Mucin mesh modification



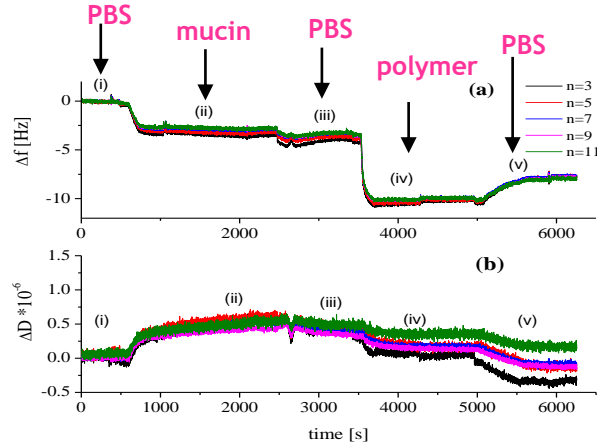
# ? CLEARANCE



## 1. Thin films

QCM-D

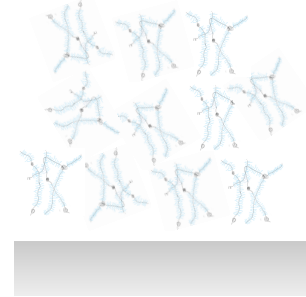
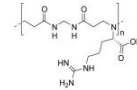
@PSCM ILL



mucin 20 mg/L

**D,L-ARGO7 (pH 7.4) 5:1 ratio**

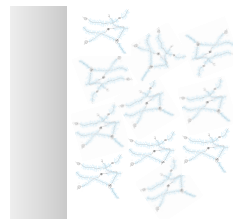
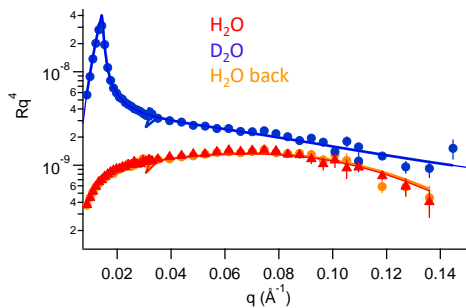
SiO<sub>2</sub> support (mucin layer 20 Å thickness/ rigid layer)



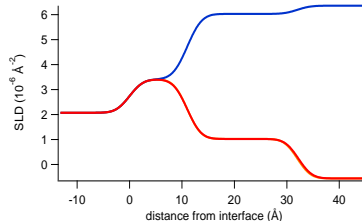
→ What is flushed?

NR

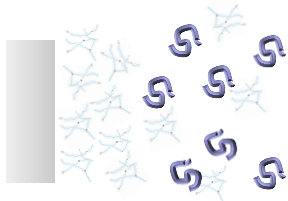
@MLZ



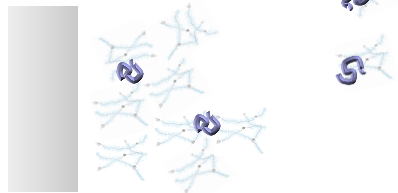
20 Å mucin layer  
Stable under solvent flushing



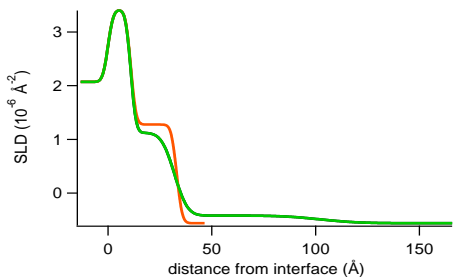
Add polymer



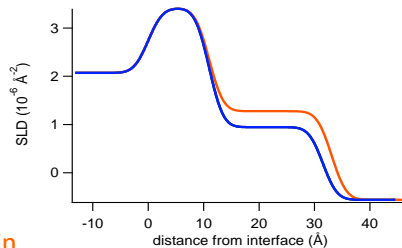
Flush



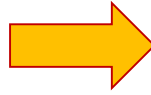
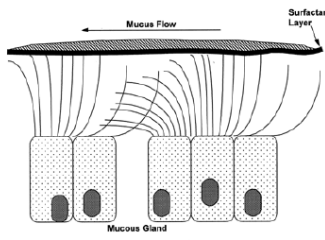
Mucin destabilization  
and partial removal by  
flushing



Mucin  
Mucin + D,L-ARGO7



Mucin  
Mucin + D,L-ARGO7 after flush

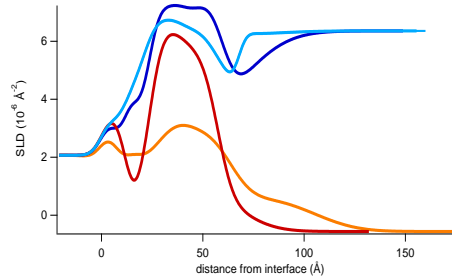
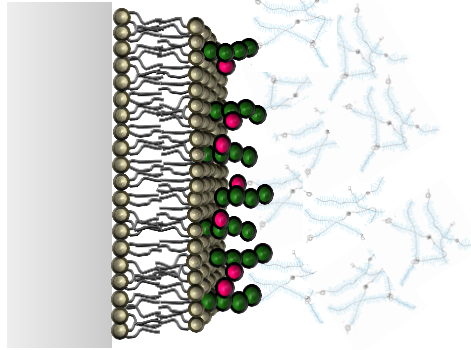
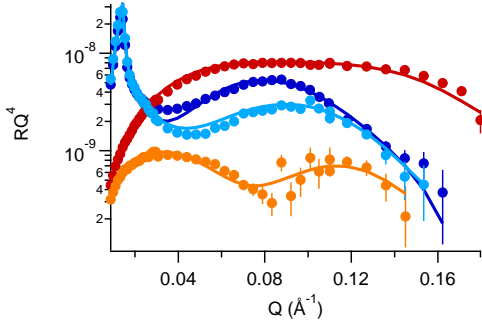


2. Add membrane

Membrane (phospholipid + glycolipid) + 30Å mucin layer

NR

@MLZ

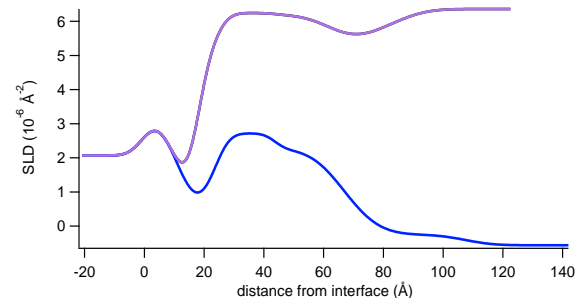
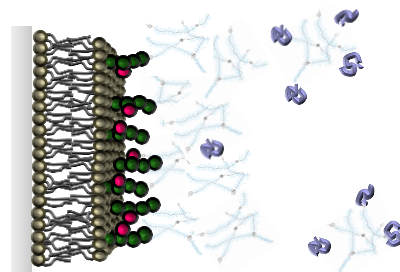
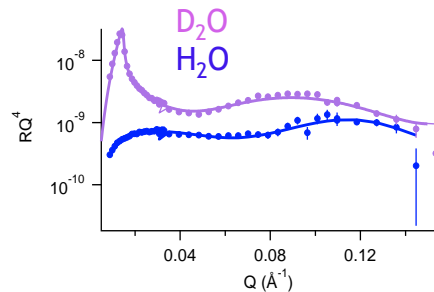


Stability under solvent flush

**NR**

@MLZ

Add polymer and flush

International Journal of  
*Molecular Sciences****Mucin destabilization and partial removal by flushing***

Article

**Mucin Thin Layers: A Model for  
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***Complex system stability under treatment***