

Howard See Young Rheologist Travel Award 2014 Report to the Australian Society of Rheology

Author: Davoud Zare

Conference: The 7th International Symposium on Food Rheology and Structure - ISFRS 2015

Location: Zurich, Switzerland

Date: June 2015

Overview

First of all, I wish to acknowledge the travel fund by Howard See Young Rheologist Travel Award (2014) and faculty research grants of Victoria University (2015) which made it possible for me to attend ISFRS 2015 conference in Zurich. The goal of this trip was to attend one of the most precious food rheology and structure conference and give a seminar. The research topics ranged from basic and applied research in rheology of food and related systems, to food structure and structure analysis, all the way to the complex relationship between food processing, structure, rheology and resulting food quality. Reports of novel findings were organized into nine parallel oral presentation sessions held concurrently (129 oral presentations in total) and 112 poster presentations which were set up in the morning of first day to let people have chance to glance them during conference break and allocated poster session in the evening. The conference began with opening lecture given by eminent scientist Jan Vermant (ETH) about structural and mechanical anisotropy in sheared colloidal followed by some amazing keynote lectures on the following days. A brief overview of the history and main topics covered in ISFRS 2015 are given below.

The 7th International Symposium on Food Rheology and Structure - ISFRS 2015

The International Symposium on Food Rheology and Structure (ISFRS) was hosted by the Institute of Food, Nutrition and Health at ETH Zürich. The symposium was initiated in 1997 by Erich J. Windhab and E. Dewald and since then held every three years in 2000, 2003, 2006, 2009, 2012 and 2015. The next symposium will take place in 2018.

The **International Symposium on Food Rheology and Structure** addresses the needs of food rheology and structure researchers. The symposium is devoted to rheology of food and related systems, to food structure and structure analysis, and to the complex relationship between food processing, structure, rheology and resulting food quality.

An overview of the state of the art and a detailed focus on recent problem areas are given by the opening lecture and several keynote lectures that are presented by well-known scientists. Oral and poster contributions are organized in individual symposium sessions grouped around the introduced research topics in food rheology and structure. All papers presented during ISFRS are published in Conference Proceedings. For ISFRS 2006 special issues of the International Journal of Food Science & Technology and Applied Rheology were published. For ISFRS 2012 special online issues in Food & Function and Soft Matter as well as in Applied Rheology were published.

Zurich/Switzerland, June 7 - 11, 2015

The 7th International Symposium on Food Rheology and Structure - ISFRS 2015 was during June 7 - 11, 2015 in Zurich/Switzerland.

The Book of Abstract is now available as pdf download.

http://www.isfrs.ethz.ch/proc/2015_abst/Abstracts_2015

Conference venue

ETH Main Building (Hauptgebäude)

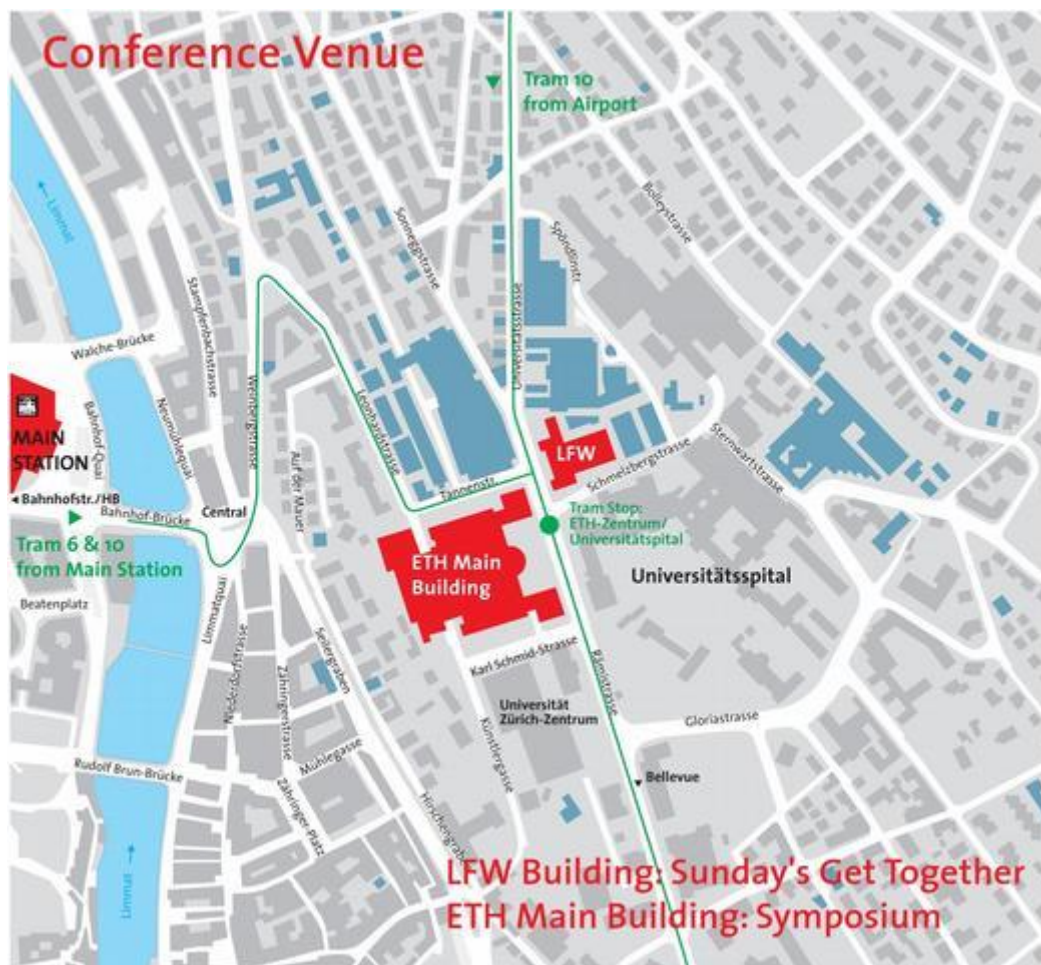
ETH Zürich/ETH Zentrum

Rämistrasse 101

8092 Zürich

Switzerland

Tram Stop: ETH-Zentrum/Universitätsspital



ISFRS 2015: Keynote Speakers

Kees de Kruif (NIZO & Fonterra): Casein hydrogels: Waterholding capacity related to swelling and rheology of caseinates

Taco Nicolai (University Le Mans): The effect of competition for calcium ions between k-carrageenan and b-lactoglobulin on the rheology of mixed gels and of the elasticity on the structure

Nicolas Roussel (LCPC Paris): Mixing laws on different length scales

Jason Stokes (The University of Queensland): Insights into food design and oral processing using soft matter physics, thin film rheology, and tribology

Jan Vermant (ETH Zurich): Structural and Mechanical Anisotropy in Sheared Colloidal Gels

Erich Windhab (ETH Zurich): Interplay of Rheology and functional structure processing along the food value chain

Bettina Wolf (University of Nottingham): Food rheology and structure for nutritionally

enhanced foods

Timothy Wooster (Nestlé Research Center Lausanne): Gastric Structuring - how food structure and rheology impact on fat digestive processing

ISFRS 2015: Symposium Program

Rheology and Structure Analysis: Rheological Methods · Rheological Modelling and Numerical Methods · Rheo-SALS, SANS, SAXS

Food Materials and Characteristics: Dough · Biopolymer Solutions and Gels · Colloidal Dispersions · Emulsions, Foams and Interfaces · Semi-Solid Foods

Food Processing: Influence of Processing on Structure and Rheology · Structure, Nutrition and Health

Sunday June 7, 2015 17:00 - 20:00	Monday June 8, 2015 9:00 - 18:00	Tuesday June 9, 2015 8:30 - 19:00	Wednesday June 10, 2015 8:30 - 18:00	Thursday June 11, 2015 8:30 - 12:00
	Plenary: J. Vermant	Plenary: C. de Kruif	Plenary: J. Stokes	Plenary: E.J. Windhab
	Session Biopolymer Session Dough	Session Processing Session Rheology	Session Biopolymer Session Emulsions	Session Modeling Session Semi-Solid
	Keynote T. Nicolai Keynote B. Wolf		Keynote Wooster Keynote Roussel	Finishing @ 12:00
	Session Biopolymer Session Dough	Session Processing Session Rheology	Session 10 Health Session 12 Emulsions Scattering	
17:00 - 20:00 Get together	18:00 - 20:00 Welcome Reception	16:00 - 19:00 Poster Session	19:30 - 23:00 Banquet	

The Final Program including all oral and poster presentation is now available.

http://www.isfrs.ethz.ch/proc/2015_abst/Abstracts_2015

Organizing Committee of ISFRS 2015

Main Organizer

Peter Fischer

Erich J. Windhab

Organizing Committee

Peter Bigler

Fabian Birbaum

Lukas Böni

Peggy Heunemann

Bernhard Koller

Volker Lammers

Viviane Lutz Bueno

Lucie Rejman

Nathalie Scheuble

Scientific committee

Jan Engmann (Nestlé Research Center Lausanne, Switzerland)

Philipp Erni (Firmenich SA, Switzerland)

Anne-Marie Hermansson (Chalmers University, Sweden)

Erik van der Linden (Wageningen University, The Netherlands)

Taco Nicolai (University Le Mans, France)

Jan Vermant (ETH Zurich, Switzerland)

Bettina Wolf (University of Nottingham, UK)

My presentation

My presentation was in Emulsions and Interfaces session and one before the last talk in the afternoon session. There were around 30 people in the room and I began by thanking the ASR and Victoria University for the funding and acknowledged support from my supervisors. I then went into the presentation ‘Interfacial viscoelasticity of protein-polysaccharide composite layers at an oil/water interface’, and managed to get through this in about 15 minutes, leaving 5 or so minutes for questions, of which I had two questions. One of the questions came from Prof. Raffaele Mezzenga (ETH, Zurich), who is world leading scientist working with beta lactoglobulin and its fibrils.

Networking & discussions

I also had the chance to discuss with Prof. Jason Stokes (UQ, Australia) and Prof. Taco Nicolai (University Le Mans, France) in the coffee break about my research. I also had the conference dinner with Prof. Peter Munro (Fonterra, New Zealand) and Dr. Tim Wooseter (Nestle Research Centre, Lausanne, Switzerland) and we had good discussions about my research and Swiss cheese and chocolate. I also spent some times with PhD students and postdocs in Prof. Peter Fischer’s lab (ETH, Zurich) and got to know more about their research and Zurich.

Conclusion Attending ISFRS 2015 in Zurich was an amazing experience for me. I got to know some world leading scientists in my research area in person and had fruitful discussion with them. I sincerely acknowledge the ASR again for giving me this opportunity through the Howard See Young Rheologist Travel Award.



Interfacial viscoelasticity of protein-polysaccharide composite layers at an oil/water interface

Prof. Kate McGrath

Dr. Jane Allison

Prof. Peter Fischer

Davoud Zare

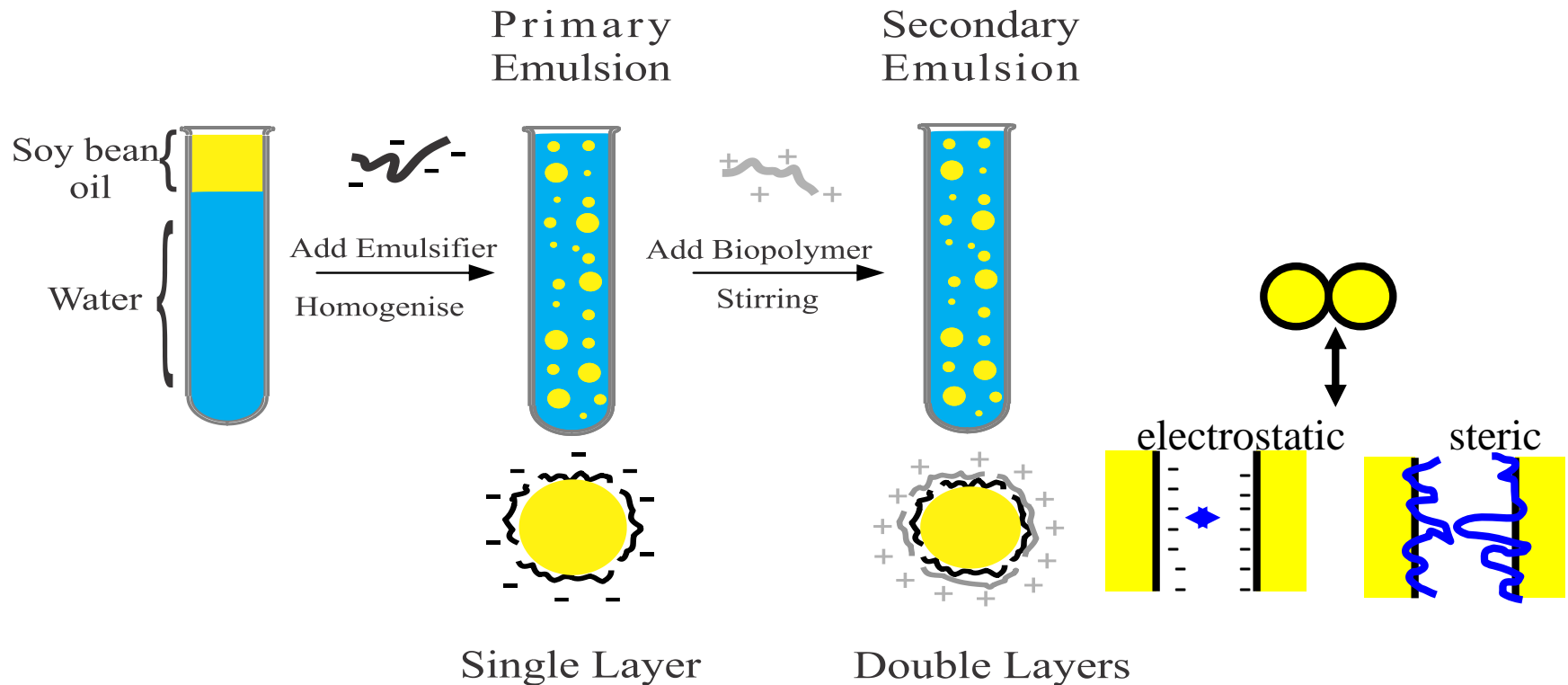
Acknowledgement



Eidgenössische Technische Hochschule Zürich
Swiss Federal Institute of Technology Zurich

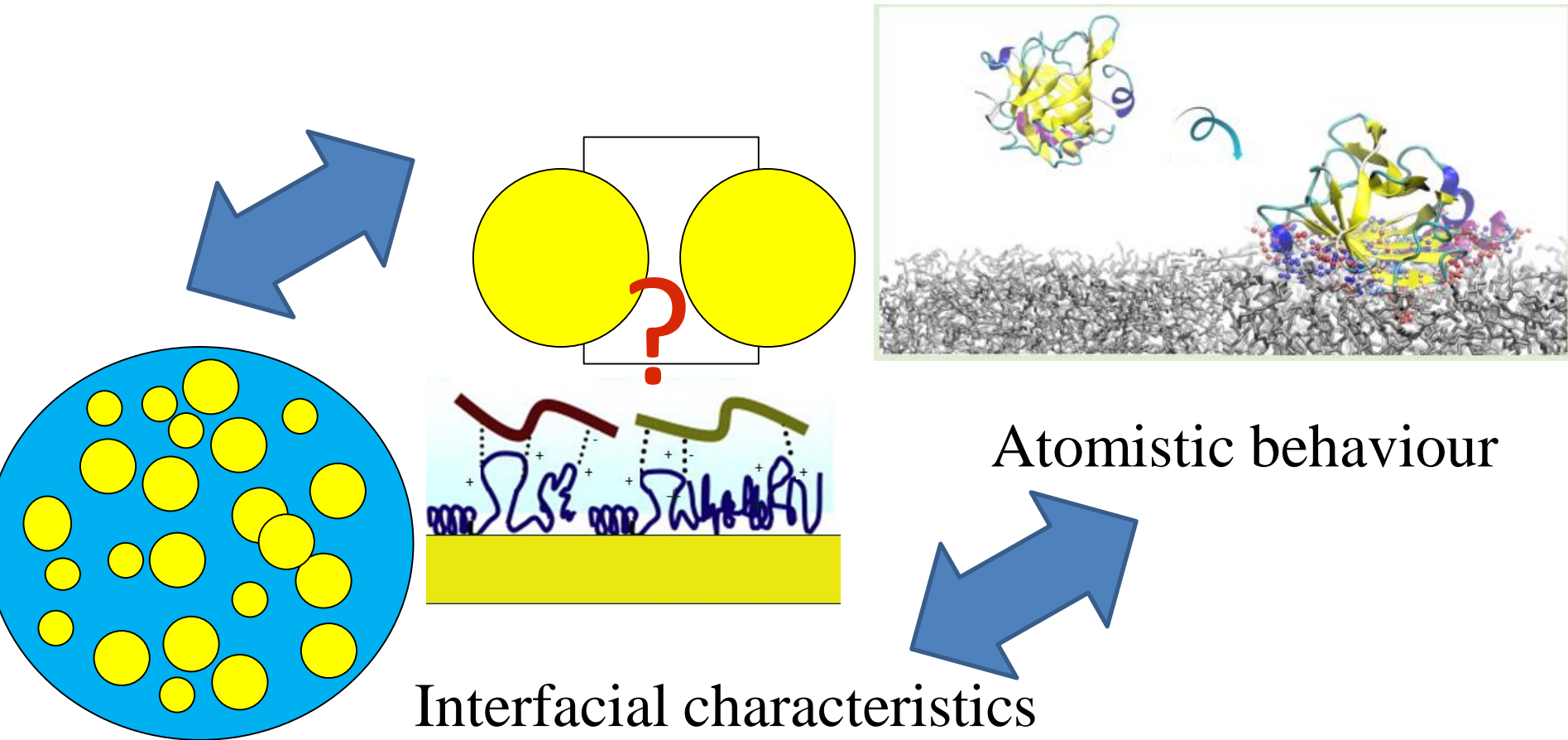


Multilayer Interfaces



- Protecting droplets against aggregation and preventing lipid oxidation
- Controlled or triggered release of active ingredients

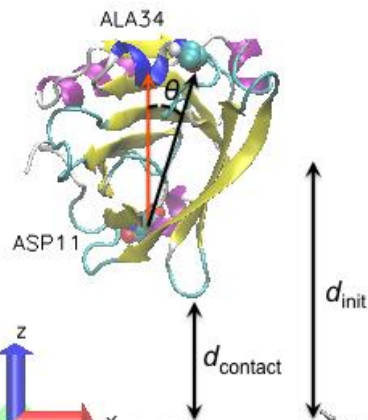
The missing link and Open questions



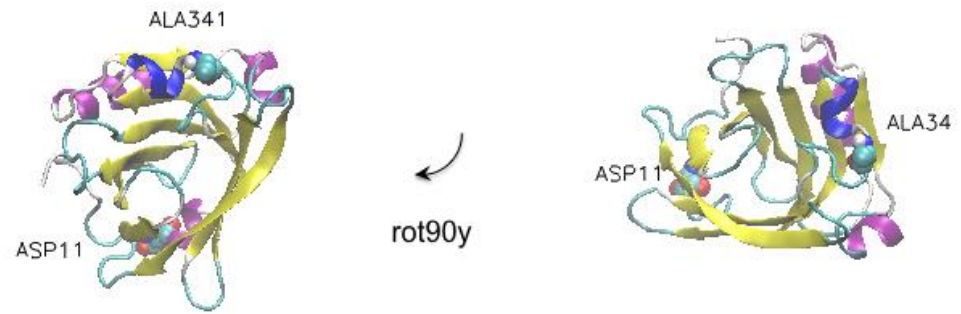
Bulk properties
stability and rheology

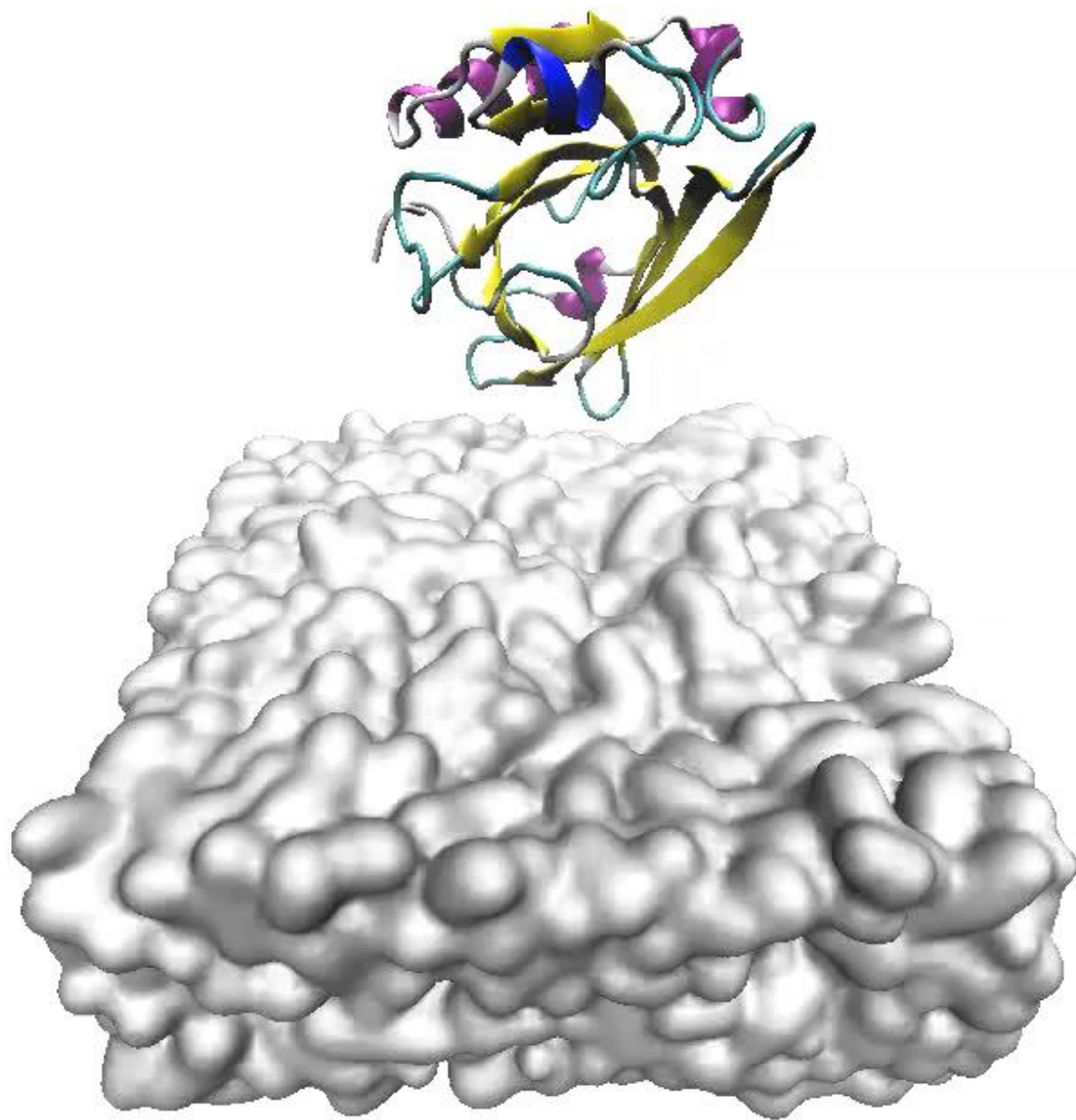
Atomistic simulation

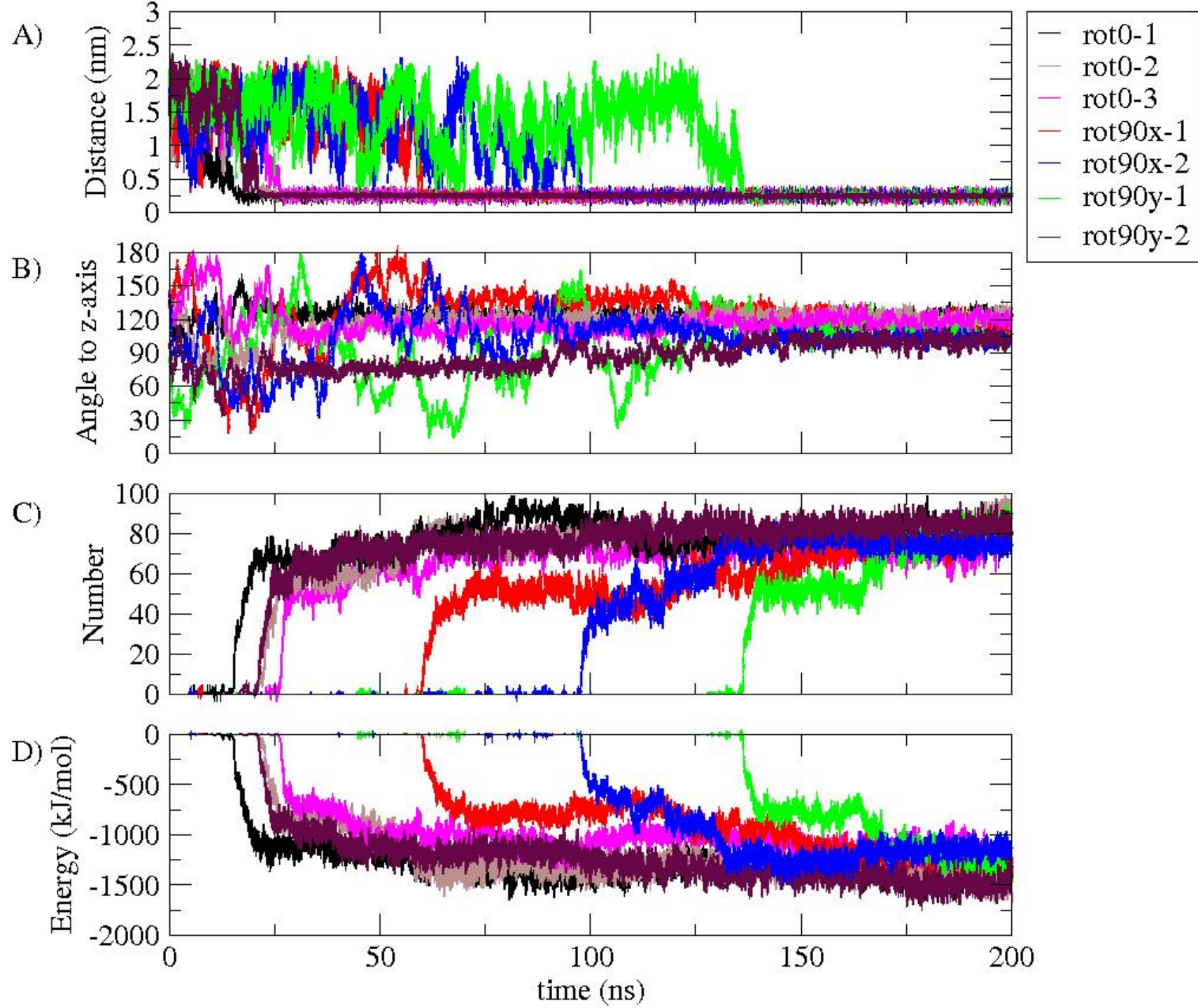
A)

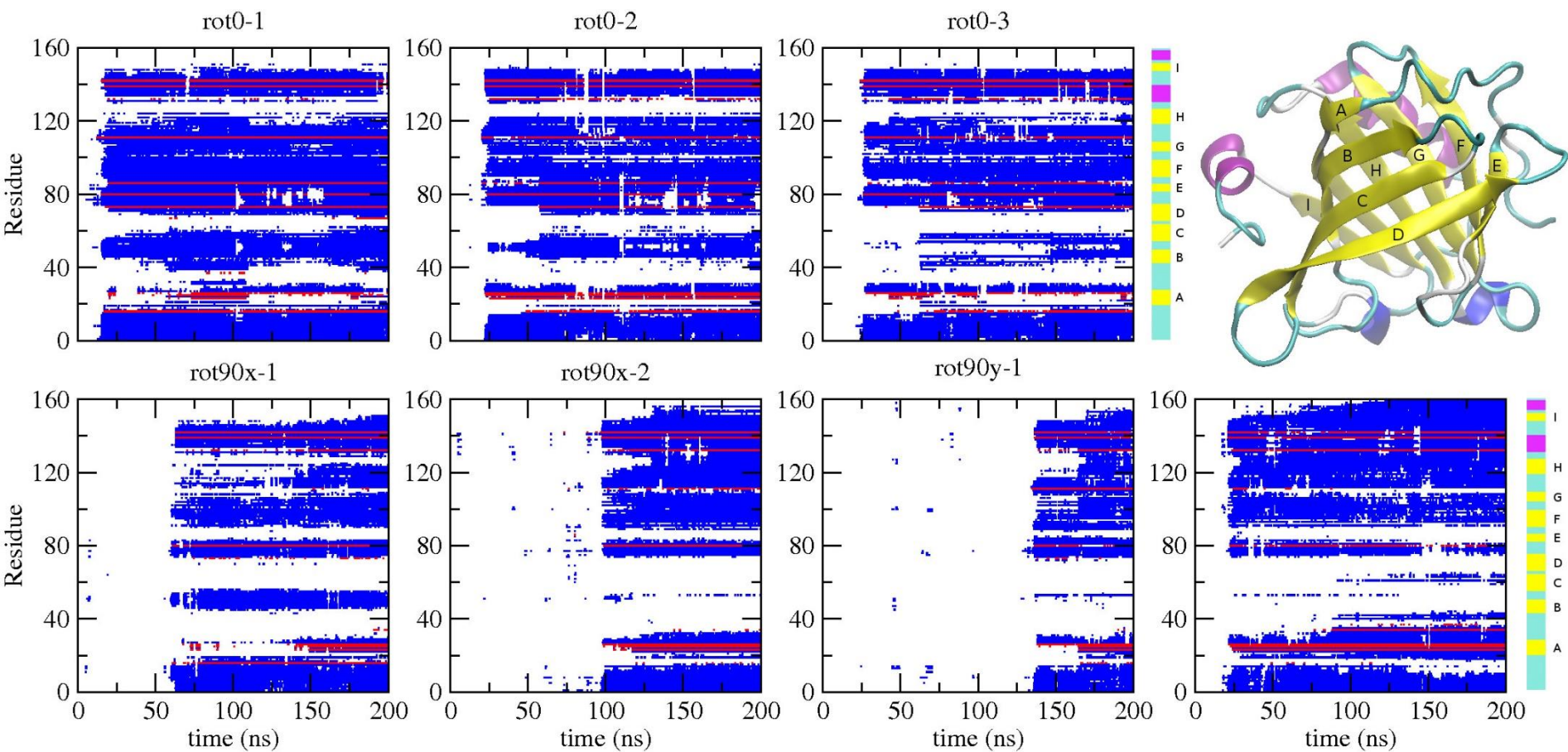


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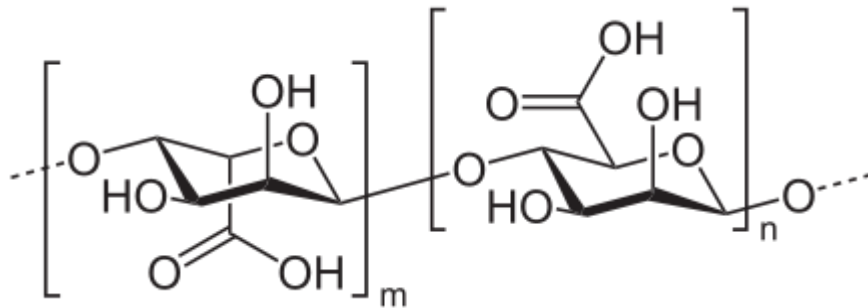




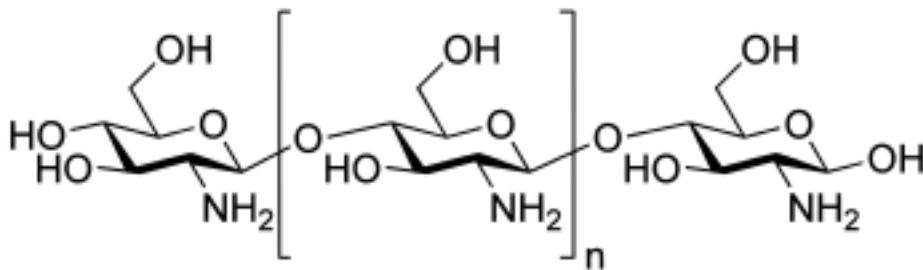


Materials and Method

- Oil: Medium-chain triglycerides (MCTs)
- Protein: Beta lactoglobulin (blg)
- Polysaccharides: Sodium Alginate and Chitosan



Sodium Alginate

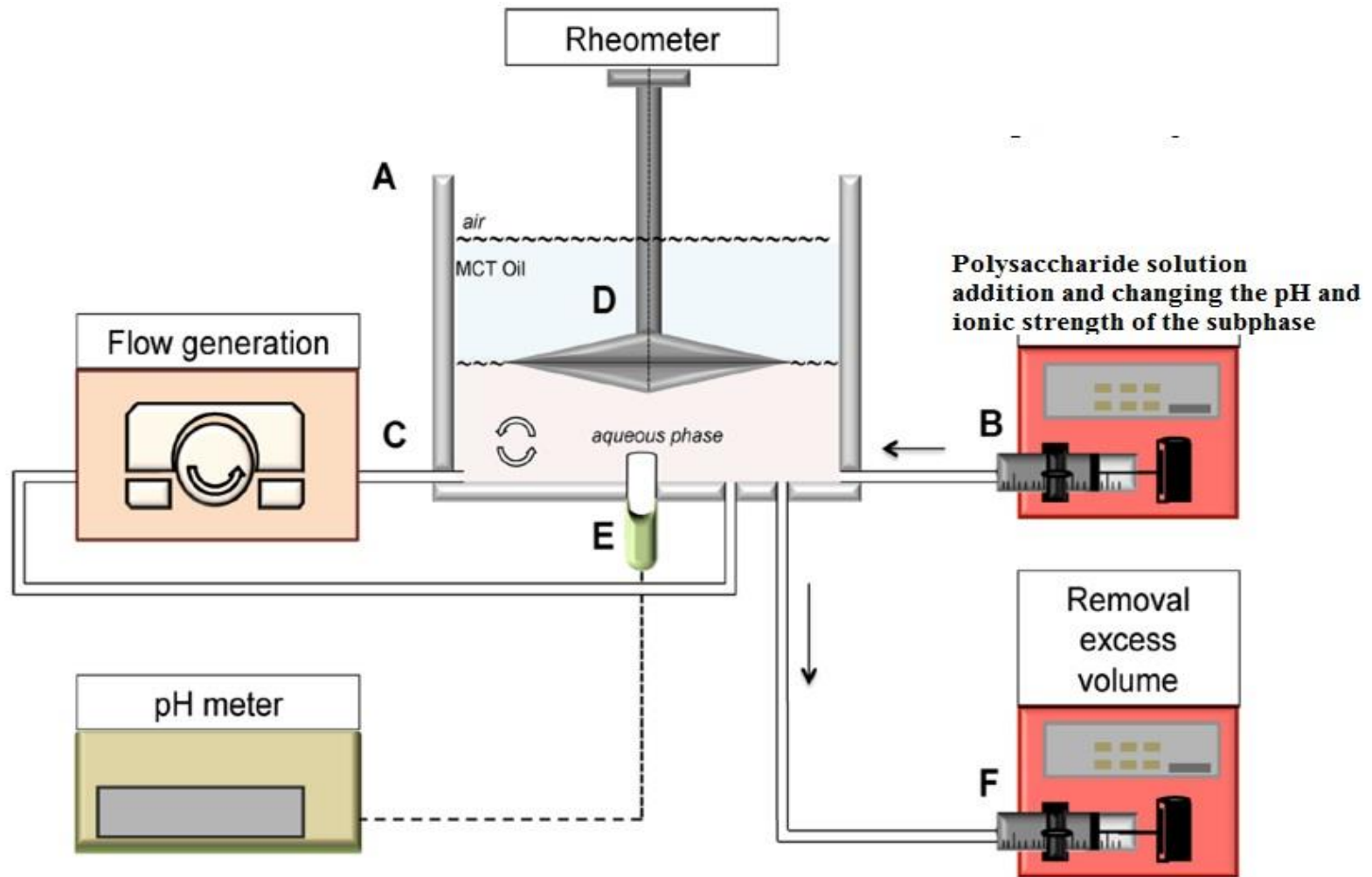


Chitosan

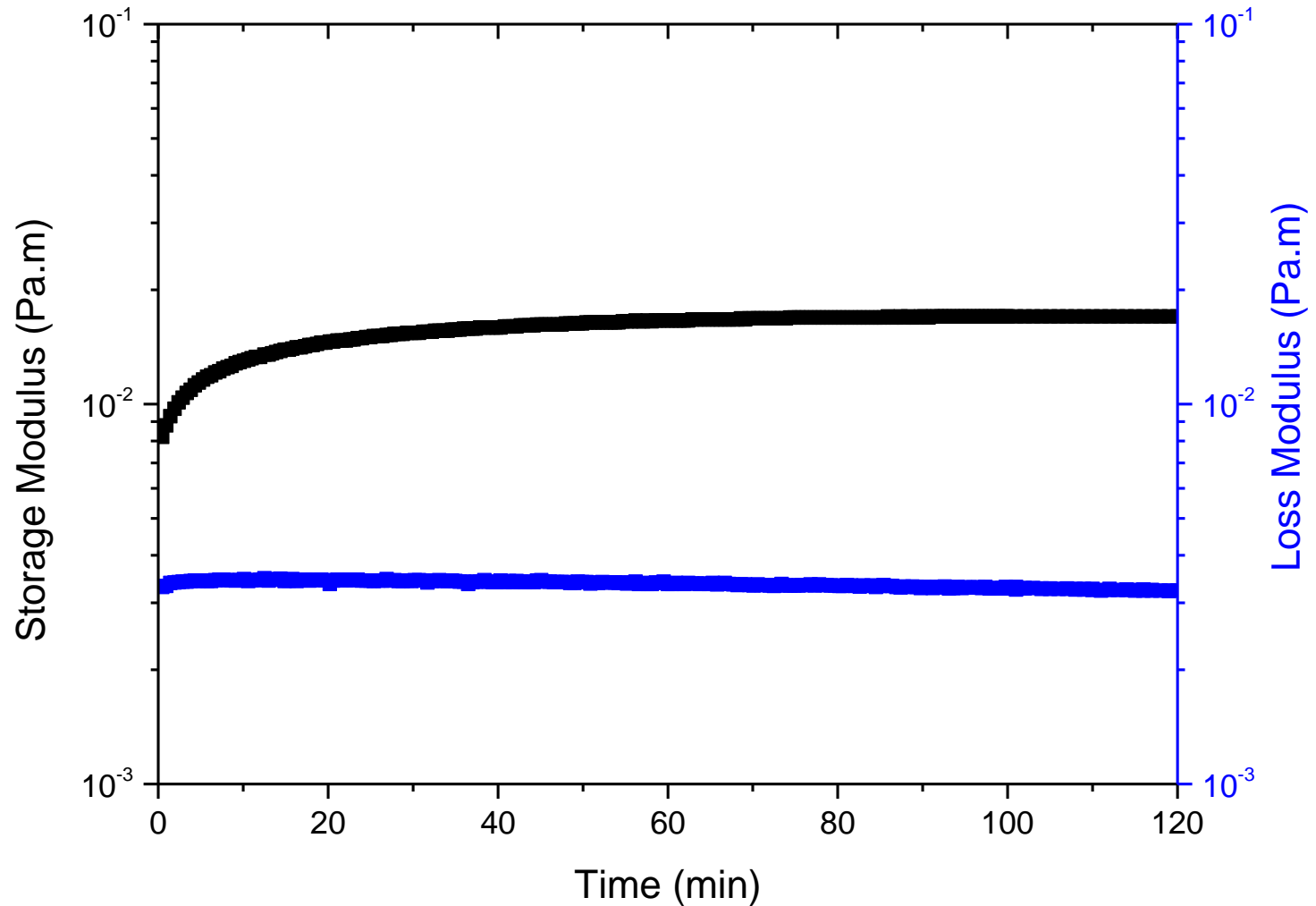


Beta lactoglobulin(blg)

The set up

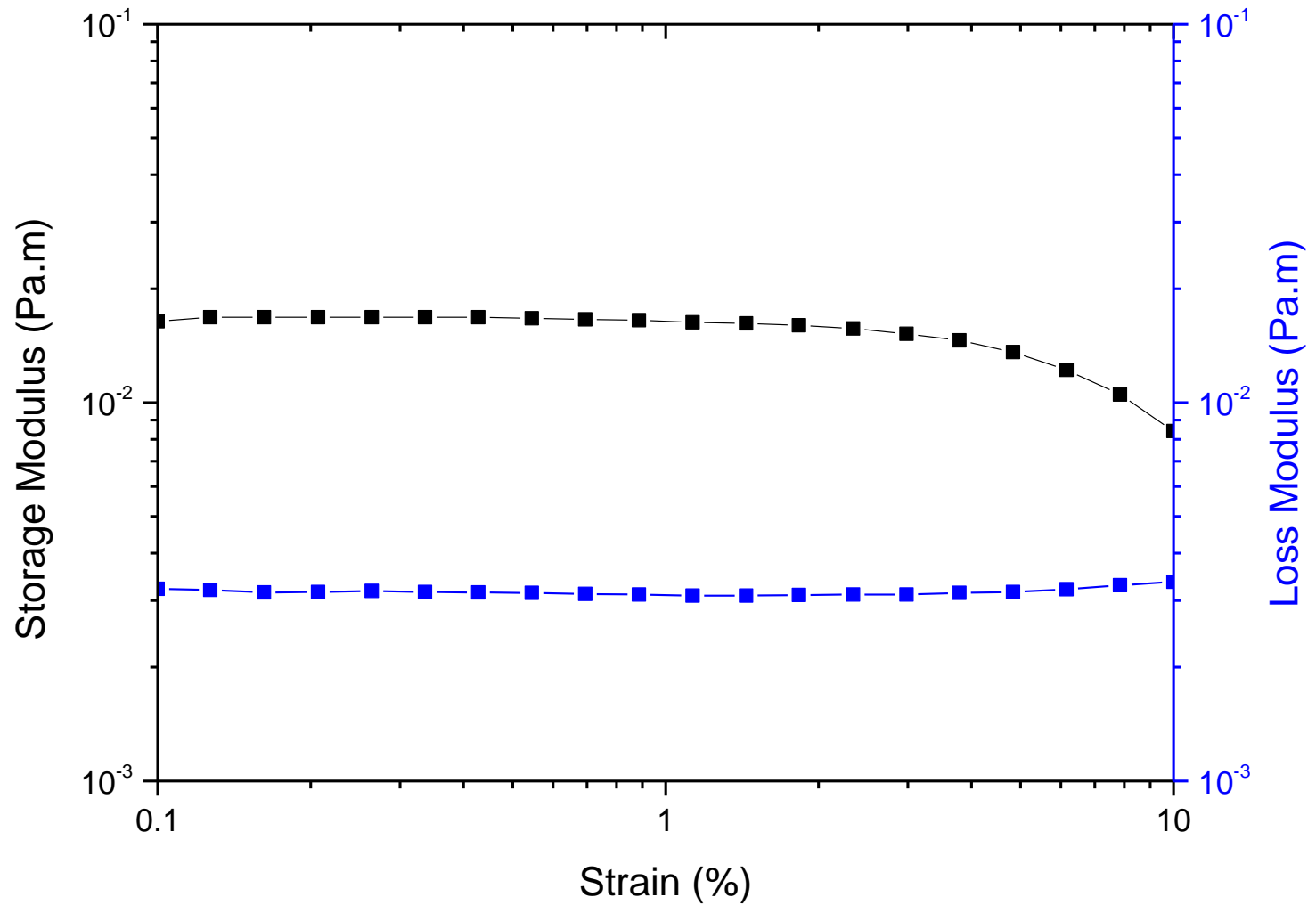


Kinetics of blg adsorption

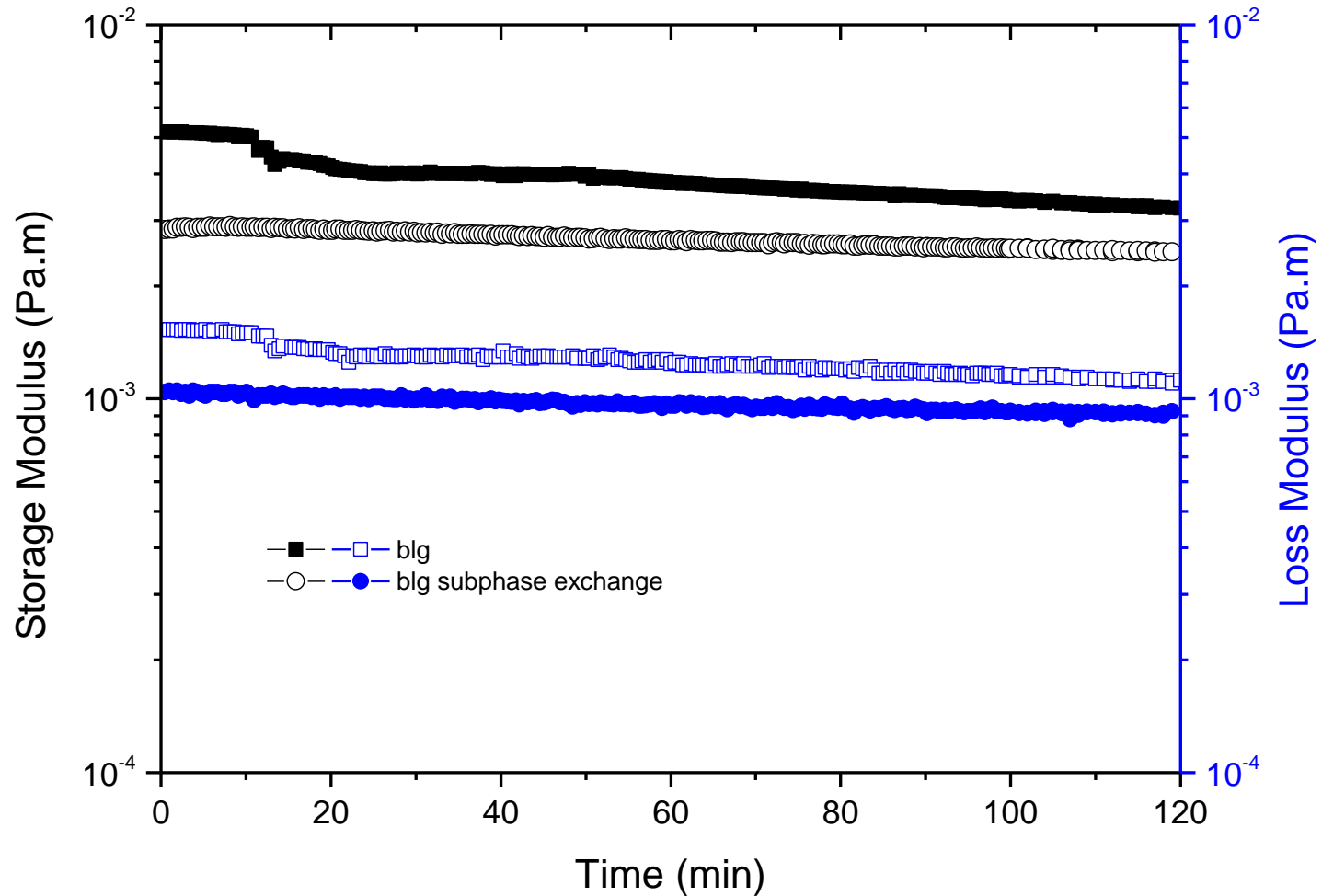


0.01 wt% blg in phosphate buffer (10mM) pH=7

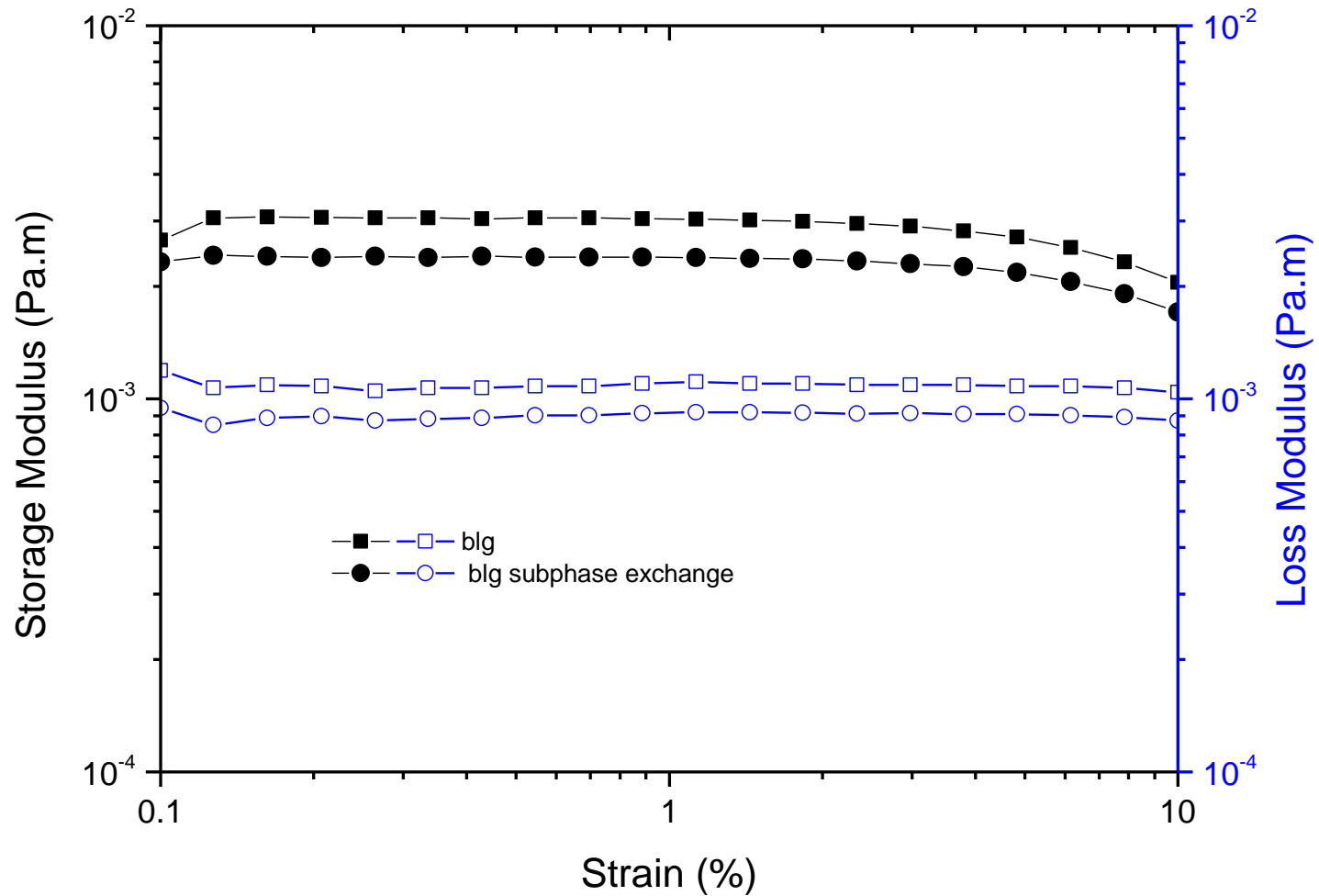
Strength of the adsorbed layer



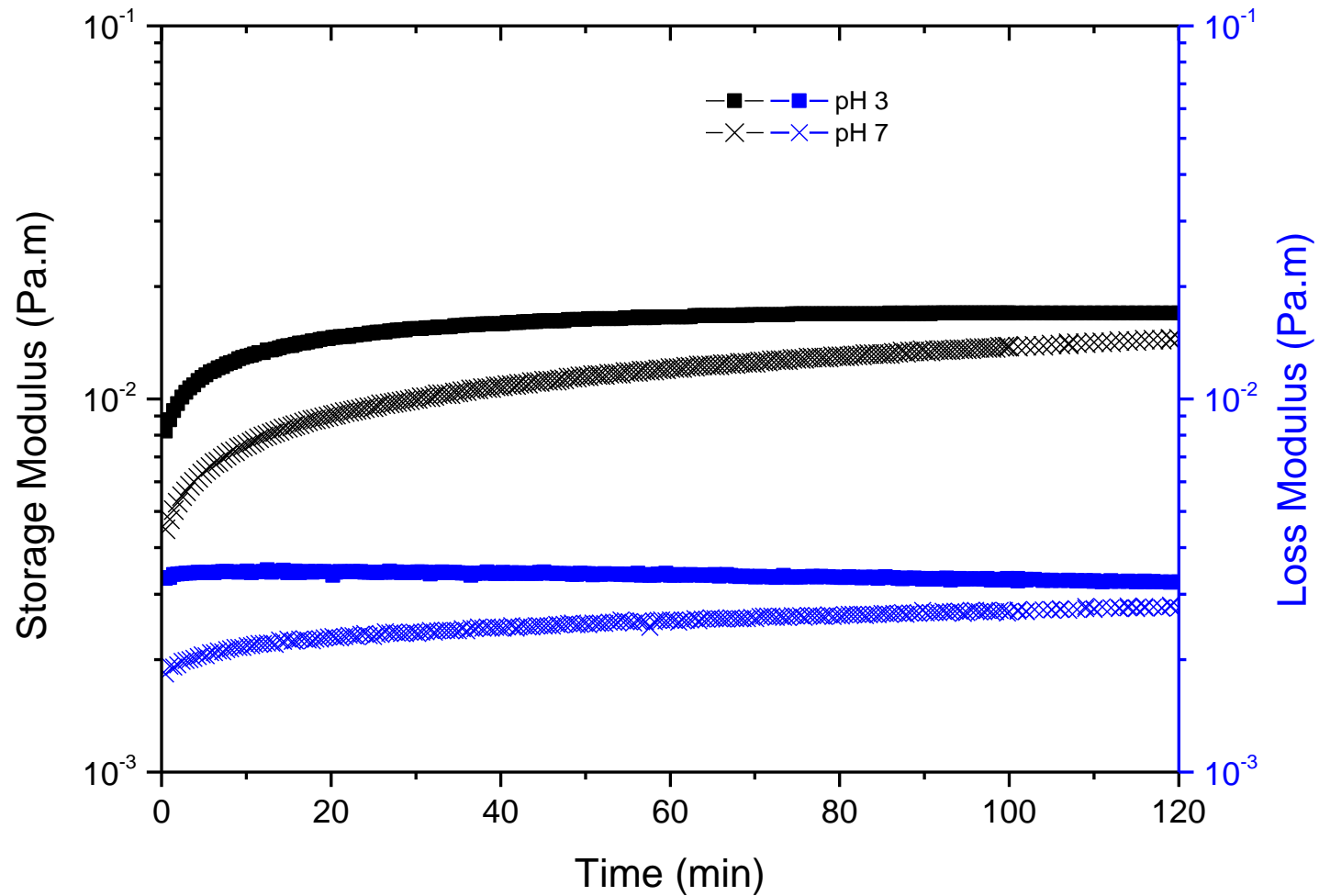
Reversible/irreversible adsorption?



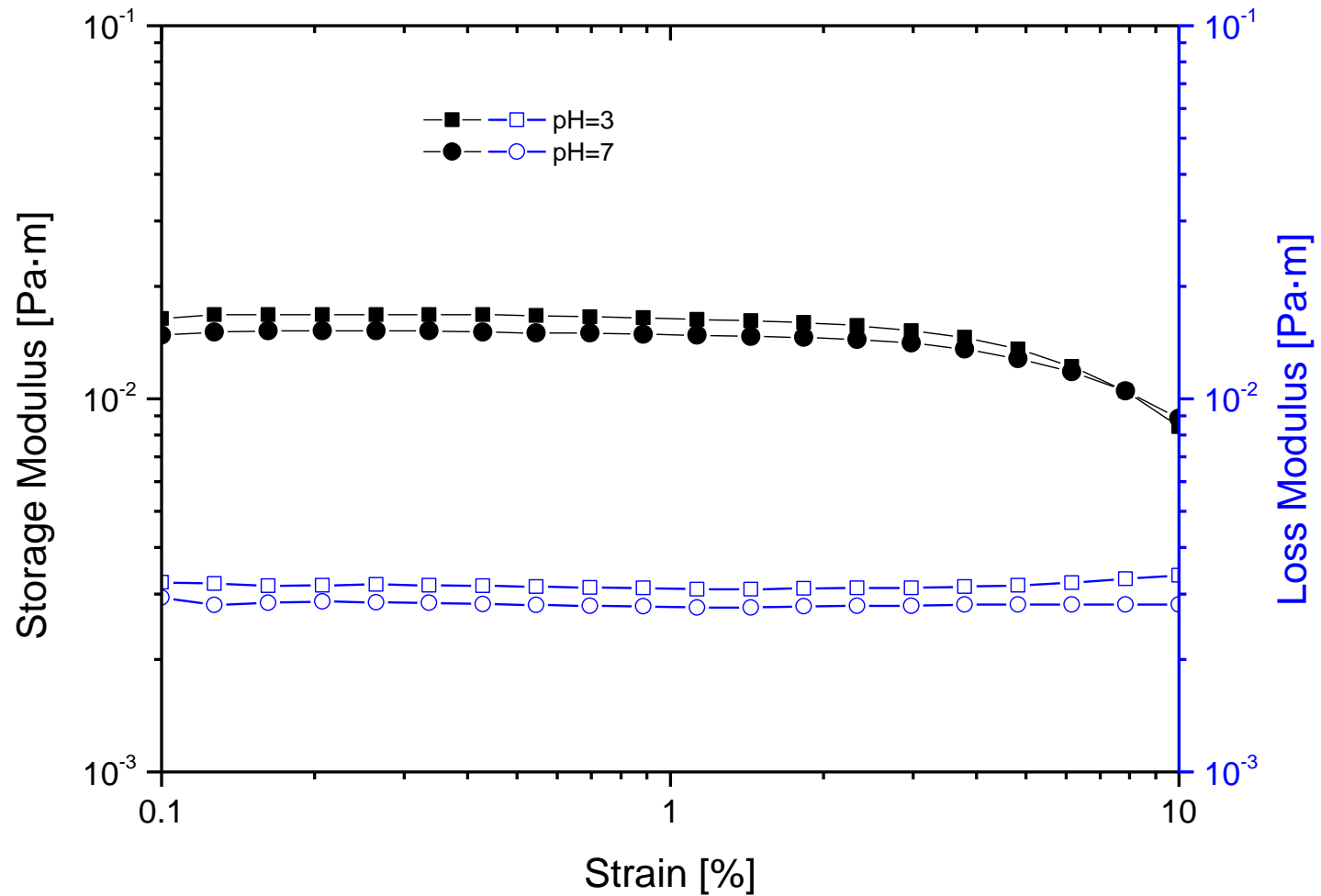
Strength of the adsorbed layer



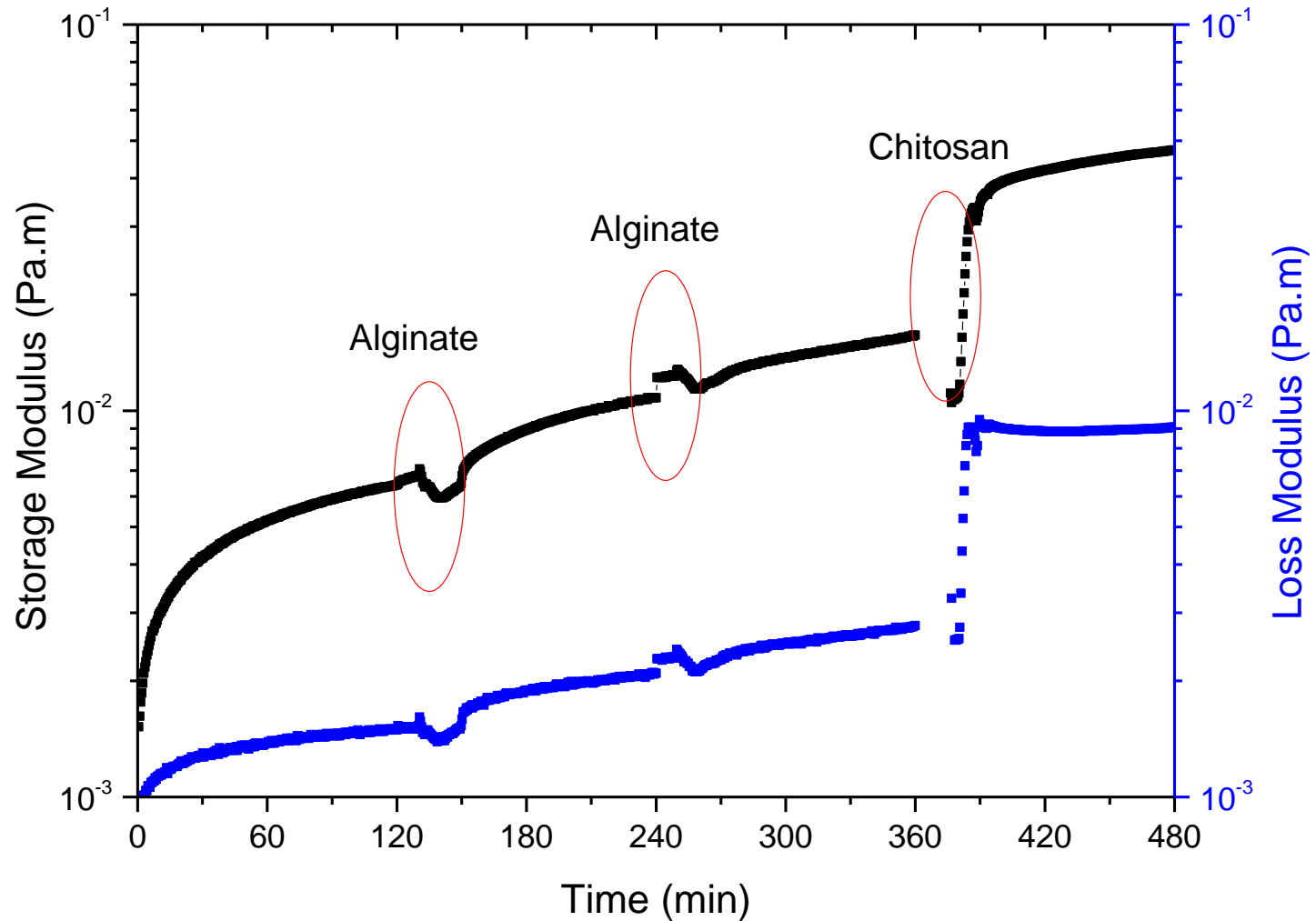
Kinetics of adsorption at different pHs



Strength of adsorbed layer

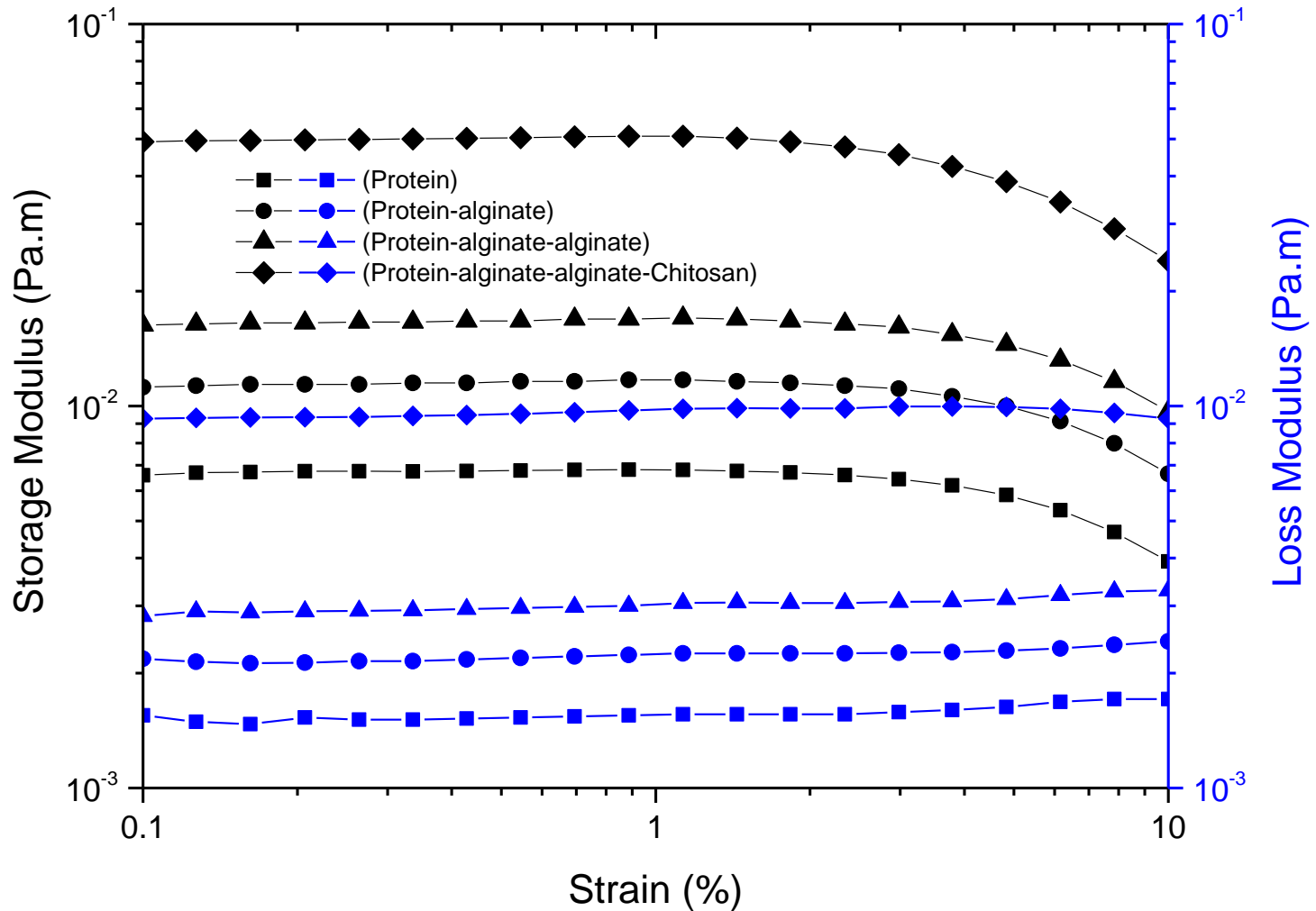


Composite layer formation



0.01 wt% blg in phosphate buffer (10mM) pH=3, 10 mL of 0.05 wt% of polysaccharides

Strength of the composite layer



Conclusion

- These coated lipid droplets by elastic laminated layers are prepared by simple cost effective method
- These emulsions have improved stability to environmental stress
- Encapsulation, controlled release, triggered release