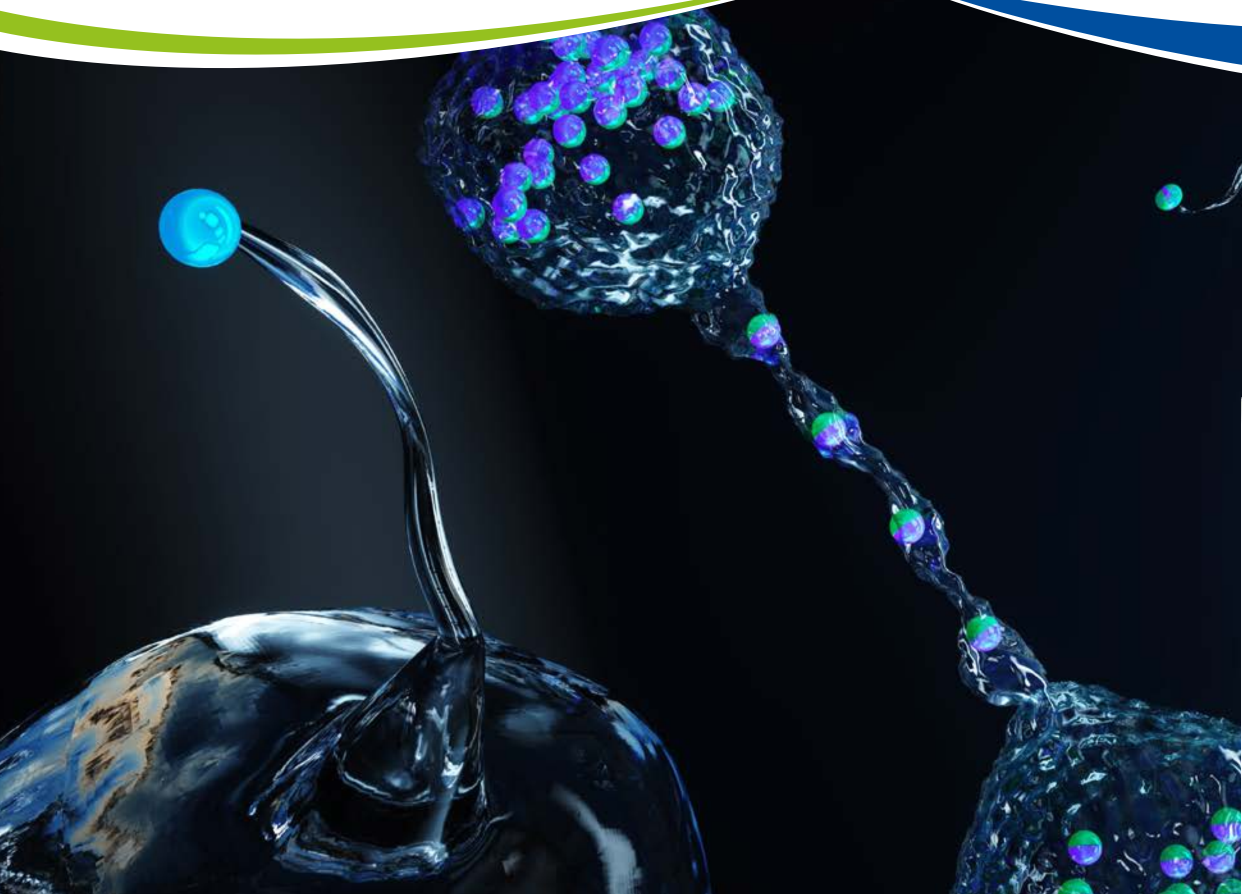
NEWSLETTER

Issue No 17 – 2022

SoftComp
SOFT MATTER COMPOSITES



In this issue

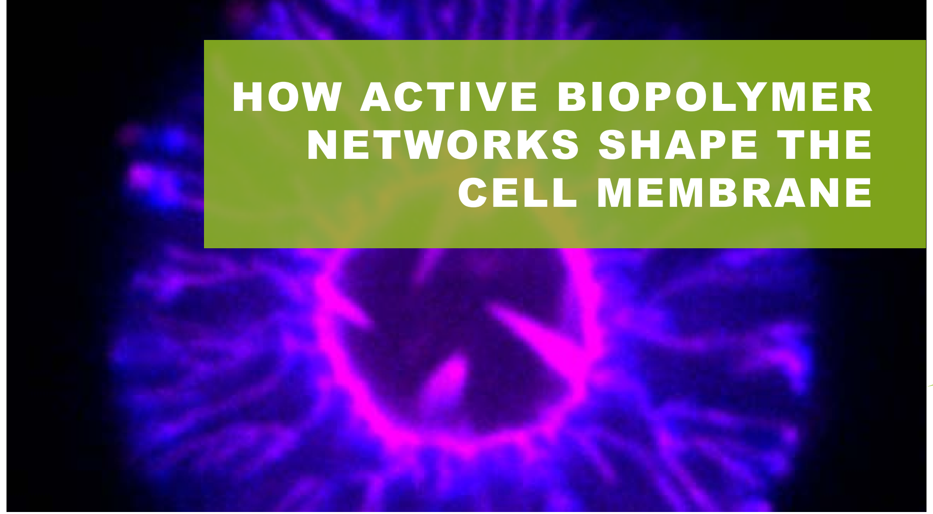
Editorial: Science and Crises

The Corona pandemic, global warming, species extinction, overpopulation - humanity is currently facing serious crises. Science clearly has a very important and challenging role to play in finding solutions. However, the current pandemic has made it plain that scientists are increasingly not only confronted with global scientific challenges but also come under heavy fire from critics and deniers, often with highly unscientific arguments.

How should science act in such an environment? Its most important assets are credibility and trust, especially in the face of uncertainty and confusion. Therefore, scientists need to be aware of what they know and what they don't know and communicate this clearly. False promises must be avoided at all costs. And last but not least, the scientific approach to solutions must be communicated to the general public again and again.

Coming back to the Corona pandemic: it has demonstrated that enormous crises require an interdisciplinary effort. Soft matter science has contributed in several ways, by providing both practical solutions – such as large-scale molecular dynamics simulations of proteins – and ideas for the future – such as the development of artificial cells as protein-analysis platforms and as potential virus scavengers.

by Gerhard Gompper & Angela Wenzik



HOW ACTIVE BIOPOLYMER NETWORKS SHAPE THE CELL MEMBRANE

by Cécile Sykes, cecile.sykes@phys.ens.fr
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Simplistically, a living cell can be viewed as a bag filled with organelles and "cytoplasm", a complex mixture of proteins. The bag consists of a membrane, a lipid bilayer that allows the passage of water and small molecules. Larger molecules are transported in or out of the cell by various active or passive membrane-embedded structures such as pumps and pores, or more complex channels of various conductance capacities. Cells are able to take up or release even greater volumes of material through endo- and exocytosis via the membrane.

Juxtaposed on the inner face of the cell membrane are networks of the biopolymer actin that are also present throughout the interior of the cell. This actin "cytoskeleton" ensures the dynamical and mechanical properties of the cell by assembling itself into semi-flexible filaments, i.e. with a persistence length comparable to cell size, about 10 microns. There is direct proof that the actin cytoskeleton can very robustly and reproducibly deform the cell membrane, and in particular, plays a role in the endo- and exocytosis of the cell (see, for example, references 1-4 in [1]).

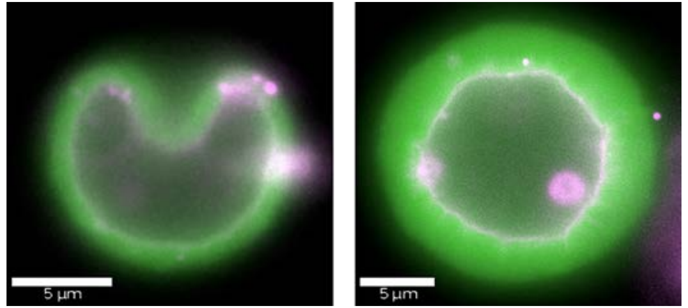
Figure 1: Membrane deformations induced by actin assembly. A membrane bilayer (pink) constituting an initially spherical liposome is deformed through the growth of a branched actin network (blue marks the colour of the end of actin filaments) at its surface. Spikes (inward) and tubes (outward) are formed during this process. Note that compared to the cell geometry, the geometry here is inside out, as the ingredients of the cytoskeleton are outside the liposome. Bar 5 µm.

Actin assembly is also known to propel intracellular bacteria such as Listeria monocytogenes, whose movement can be mimicked using beads or soft droplets/liposomes [2]. Such mimicking allows for a mechanical and biochemical understanding of the mechanism of propulsion based on squeezing and pushing forces generated by the directed growth of the actin network. Most motile events are powered by branched actin networks, formed when new actin filaments are nucleated as branches on the sides of mother filaments due to the presence of an activator at the surface of the bead, bacterium or cell membrane [3]. The force-producing actin network therefore consists of a branched, entangled, semiflexible network that constantly generates new branches at an activated surface.

Motile cells, including various mammalian cells, also use actin assembly and dynamics for their movement. Actin assembly pushes out the cell membrane at the front while actin and molecular motors, e.g. myosin, pull forward the rear by contracting the "cortex", a thin shell of actin (a few hundred nanometers thick) that lies underneath the plasma membrane. Experiments where a cell cortex mimic is grown outside a liposome doublet allows for the quantification of the tension generated during this contraction. The Laplace law, also known as Young's law, is used to estimate the tension increase by monitoring the change in angle between the two liposomes during acto-myosin action [4]. Strikingly, the maximal tension increase is limited to roughly 1.3-fold, in agreement with measurements in cells.

Growing a branched actin network around a liposome unambiguously reveals the elastic properties of such a network, manifested by buckling and wrinkling behaviour [5]. The experiment consists in varying the network growth time to obtain a range of actin shell thicknesses from a few hundred nanometers to several micrometers. The subsequent dilution of the external buffer generates an osmotic shock, i.e. water flows out of the liposome to equilibrate the solute on both sides of the membrane. The resulting liposome shrinkage generates a shape change of the actin shell. A buckled shape is observed for thin shells while thick shells wrinkle (Figure 2, page 4).

Such thickness-dependent behaviour is well described by a soft elastic matter model where



buckling costs the least energy when the actin layer is thin, as only the edge of the buckled actin region is deformed. When the layer is too thick to buckle, wrinkling occurs involving local compression of the network. The transition between the two regimes allows for an estimate of the wrinkling wavelength (2 µm), which is larger than the predicted one (350 nm). This disparity is explained by the pre-stress in the actin shell due to the spherical growth [5].

Using similar experimental set-ups with a dynamic actin assembly of branched networks on liposomes, cell-like membrane deformations are observed including tubes and spikes (Figure 1, page 2) [1]. Tubes are reminiscent of plasma membrane local shape changes during endocytosis, while spikes mimic the filopodia that cells use to investigate their surroundings. These findings indicate that cells may use the elastic properties of growing branched actin networks to deform membranes for different functions even when the biochemical components of the system are unchanged.

Looking forward, experiments on active deformations of a membrane by an actin assembly may inspire new materials and approaches. First, the detailed mechanism of what could be called "elastic wetting" i.e. how a branched elastic network generates deformations of the substrate on which it is growing, is still to be understood. Second, the biological relevance of these findings is that deforming the membrane with cellular ingredients does not require curvature-inducing molecules as previously thought, although such molecules exist and play a role, probably in parallel with actin-only mechanisms. As often in biology, robustness is ensured by redundancy. Our results showing endocytosis-like structures with a simple set of actin-binding proteins raise the hypothesis as to whether endocytosis could be controlled for medical purposes, e.g to make it more difficult for a virus to enter cells by temporarily changing the dynamics of the actin network locally, thus altering membrane deformation to alleviate or completely prevent viral infections.

References

[1] C. Simon et al., Nature Physics 15, 602 (2019).

[2] J. Plastino and C. Sykes, Curr Opin Cell Biol 17, 62 (2005).

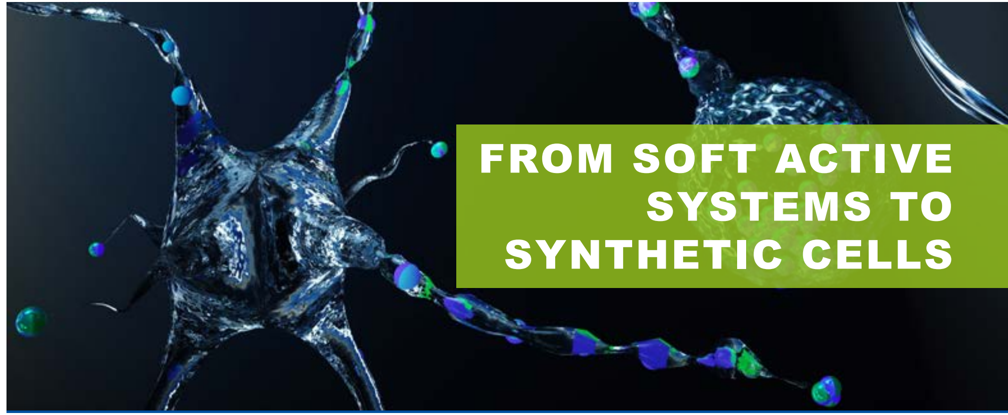
[3] C. Sykes and J. Plastino, Nature 464, 365 (2010).

[4] V. Caorsi et al., Soft Matter 12, 6223 (2016).

[5] R. Kusters et al.,, Soft Matter 15, 9647 (2019).

Figure 2: Buckling (left) and wrinkling (right) of a thin (left) or a thick (right) actin shell (green) grown around a membrane (pink). Bars, 5 µm.


by Hanumantha Rao Vutukuri (left), h.r.vutukuri@utwente.nl, ETH Zürich, Switzerland (currently: University of Twente, the Netherlands) and Dmitry A. Fedosov, d.fedosov@fz-juelich.de Forschungszentrum Jülich, Germany

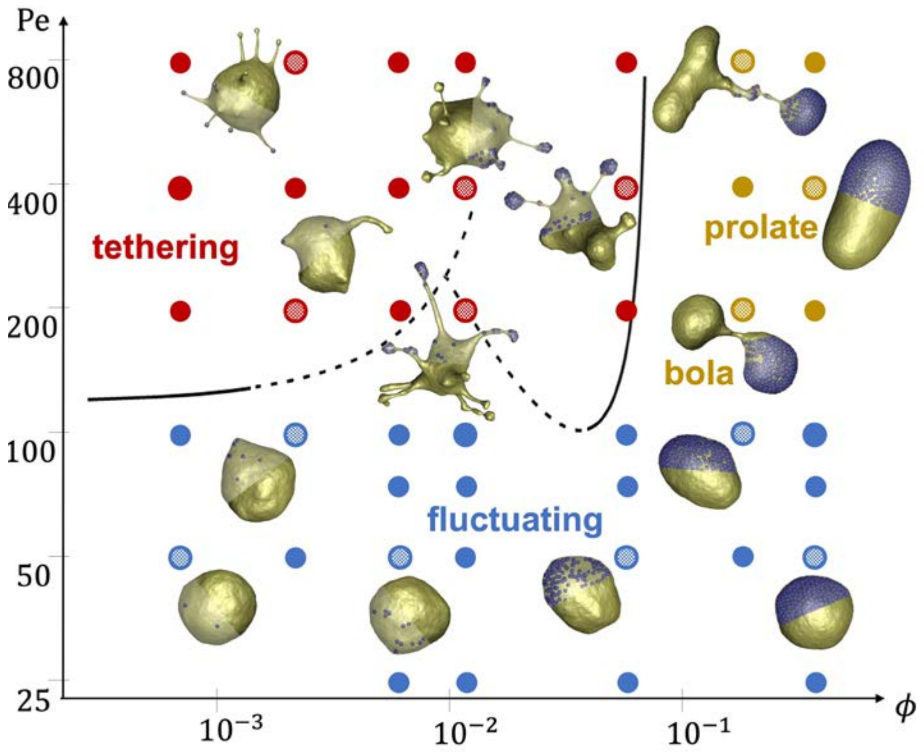


FROM SOFT ACTIVE SYSTEMS TO SYNTHETIC CELLS

Biological cells are fascinating soft microsystems, which can process chemical and mechanical information and actively respond to internal and external perturbations [1]. One of the important fundamental challenges of modern science is to understand cellular self-organization and function, and reconstitute the basic principles of life. To this end, engineering simple cell-mimicking systems allows us not only to learn about their natural counterparts, but also to derive design principles of soft functional micro-robots capable of performing cell-like and beyond-nature tasks. Here, we highlight our recent collaborative study [2] between the ETH Zürich, Switzerland, and the Forschungszentrum Jülich, Germany, on a novel active system of self-propelled particles (SPPs) enclosed in a lipid vesicle, which exhibits dramatic shape changes resembling those of biological cells.

Artificial soft-matter systems, such as giant unilamellar vesicles, have been successfully used as a minimal model system to mimic biological cells [3]. Despite numerous studies on the design of complex vesicle systems, the realization of a minimal system, in which localized active forces can strongly deform lipid membranes from the inside and induce dramatic shape changes, remains challenging.

We have addressed this challenge through the development of a unique synthetic system where active particles are confined within giant vesicles [2]. In this system, the cell membrane is mimicked by a dioleoylphosphatidylcholine (DOPC) lipid bilayer, and localized forces are generated by self-propelled Janus particles catalytically driven in the presence of hydrogen peroxide H_2O_2. In experiments, the volume fraction (Φ) of active particles was modulated



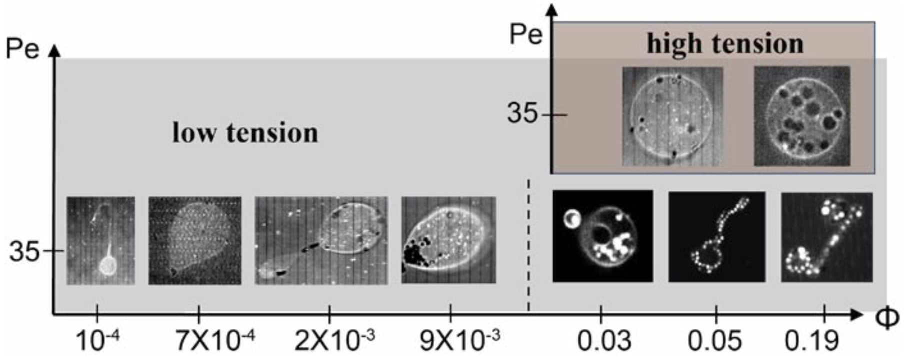
to control overall activity strength as well as the tension of the membrane to alter membrane properties. In order to understand the emergent behaviour of this active system, we have also performed Langevin dynamics simulations of active Brownian particles enclosed in thin membrane shells, described by dynamically triangulated surfaces.

Our combined experimental and simulation study reveals the existence of a plethora of novel vesicle shapes, which do not exist in equilibrium systems. Figures 1 and 2 show the formation of tether-like protrusions and highly branched, dendritic structures at low and moderate particle loadings. At high volume fractions of active particles, globally deformed vesicle shapes such as bola shapes are generally observed, resulting even in vesicle division in some cases. Note that at low Φ, tether formation is initiated by single SPPs, while at moderate volume fractions, the initiation of tethers is performed by small particle clusters. The clustering of active particles is enhanced in places with a high local membrane curvature, such that there exists a feedback mechanism between SPP accumulation and local curvature induction by particle clusters. The transition to tethering as a function of the Peclet number (Pe, characterizes particle propulsion strength) is also well captured by a theoretical model, which is indicated by the black lines in Figure 1. The suppression of membrane tethers at large Φ is due to the induction of significant active tension mediated by the collective behaviour of SPPs. Finally, experimental and simulation results correspond well to each other, suggesting that the simulation model properly captures the physical principles of this active system.

Strikingly, 'less is more' for this active system, such that a moderate number of SPPs or a moderate total strength of active forces induce the most dramatic vesicle shape changes. This is also likely the case for biological cells, where the cytoskeleton actively exerts local forces to dynamically sculpt the cell shape.

Figure 1
Simulated state diagram
illustrating various membrane structures for
different Peclet numbers (Pe) characterizing particle propulsion
strength and volume fractions (ϕ) of active particles. The three main regimes are tethering
(red symbols), fluctuating (blue symbols) and bola/prolate (brown symbols) vesicle shapes. Each dot containing a
grid pattern indicates the position of the nearest snapshot within the shape diagram. Simulations mimic a nearly tensionless flaccid vesicle.

Figure 2: The experimental shape diagram summarizes the observed vesicle shapes induced by the activity of SPPs for different ϕ and fixed Pe. High-tension vesicles are not showing any noticeable deformations.



Our study provides a foundation for future developments of cell-mimicking artificial systems, such as small-scale soft robots and synthetic cells.

References

[1] D. A. Fletcher and R. D. Mullins, Nature 463, 485 (2010).

[2] H. R. Vutukuri et al., Nature 586, 52 (2020).

[3] R. Dimova and C. Marques, The Giant Vesicle Book (CRC Press, 2019).

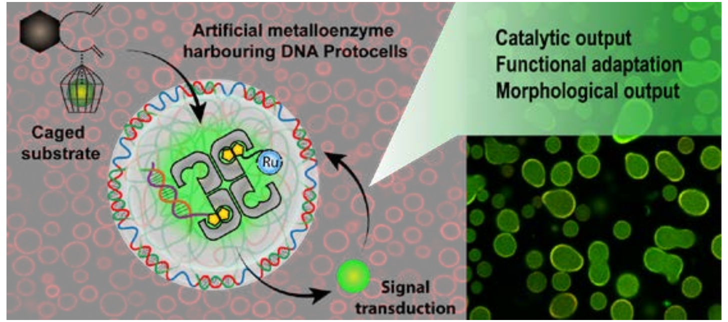
TOWARDS THE MINIMALISTIC DESIGN OF LIFE-LIKE ABIOTIC SYSTEMS

Protocells are self-organized, endogenously ordered, spherical systems usually formed by lipids, that are thought to be an important stage in the origin of life. The ability to mimic elementary aspects of cellular non-equilibrium processes in protocell models could also pave the way towards designing life-like systems orchestrating complex spatio-temporal transformations. Recently, we unravelled polymer-like phase-separation behaviour in multiblock single-stranded DNA by activating a nucleobase-specific lower critical solution temperature, which provides an opportunity to fabricate all-DNA protocells (PC) with several encoded sequences for post-functionalization with spatio-temporal control.

Furthermore, we introduced a functional and morphological adaptation concept driven by a bio-orthogonal metabolic reaction in these PCs. To achieve a metabolic transformation, we encapsulated a genetically modified artificial metalloenzyme (ArM) whose ring-closing metathesis activity on a pro-fluorescent substrate generated a green-fluorescent metabolite that weakened the A-T (adenine-thymine) duplexes of the PC shell by intercalation. This metabolic reaction led to PC growth, DNA mechanosensor activation, and interparticle PC fusion. Genetic engineering of the metalloenzyme increased the catalytic efficiency, and we observed significant molecular crowding effects.

Even though interdisciplinary techniques to explore the design, structure, function, and evolutionary potential of metabolic PCs with genetically evolved catalysts are in their infancy, our approach offers valuable insights into how chemically triggered adaptive behaviour of prebiotic coacervates can be achieved, and is a step towards the minimalistic design of life-like abiotic systems.

Read more: Samanta, A. et al., Nat. Nanotechnol. 15, 914 (2020).
SoftComp partner: Johannes Gutenberg University Mainz



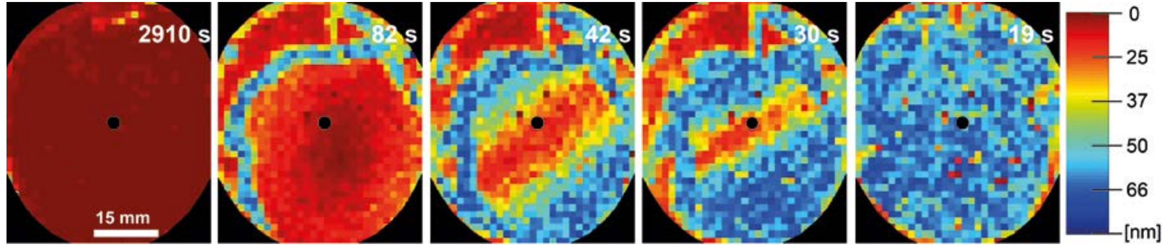
The new concept makes it possible to induce complex behaviour in adaptive and communicating soft matter microsystems.

CREEP DYNAMICS AND FAILURE OF A BIOPOLYMER GEL

Failure is a topic that has received a lot of attention in the community of soft matter from a scientific and industrial point of view. Among soft systems, understanding failure in biopolymer gels is crucial as they are used extensively in food and biomedical applications. Biopolymers form polymeric networks made of fibrils, whose stiffness is responsible for the development of negative normal stresses and strain hardening under shear.

At CNRS Montpellier, we have studied the microscopic mechanisms leading to failure in biopolymer gels and their interplay with the gel's distinctive features by using a novel setup coupling dynamic light scattering to rheology. The setup allows time- and space-resolved measurements of the microscopic dynamics to be made during gel formation within the rheometer plates, and also the successive creep test which eventually leads to failure.

We have evidenced the presence of several types of failure precursors in the microscopic dynamics during the creep test (see figure), but also during gel formation, and have found that gels which eventually fail are characterized by irreversible rearrangements of the bond distribution during gelation. These rearrangements are driven by negative normal stresses developed during gelation and reduce the gel resistance to shear stress. In this way, we have demonstrated that the ultimate fate of biopolymer gels under constant shear load can be inferred by the behaviour of normal stresses developed by the gels during their formation.



Read more: Pommella A. et al., Phys. Rev. Lett. 125, 268006 (2020)
SoftComp partners: CNRS/ University of Montpellier

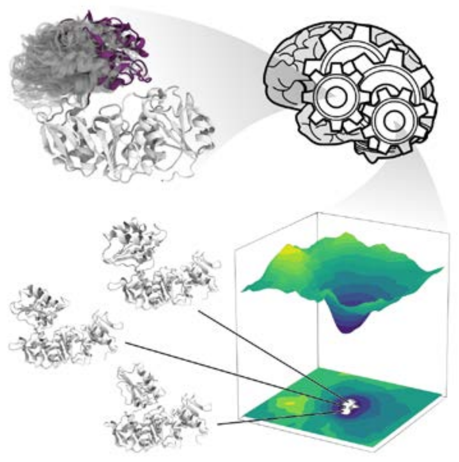
Experimental maps of the local dynamics over 1 s for a biopolymer under creep, measured by time- and space-resolved dynamic light scattering. Labels: time before failure.

SAMPLING PROTEIN CONFORMATIONAL SPACE

Proteins occur in nature in enormous numbers and fulfil a huge range of biological tasks. Yet they are all simply made up of the same 20 amino acid building blocks, assembled into polymers and folded into a wide variety of shapes that determine their function. Proteins should however not be considered as a single atomic arrangement: they are flexible, exploring a continuous conformational space often described as a set of low energy states connected by higher energy transition paths.

Current experimental techniques provide a good picture of the most stable conformations, but little on the transition path or intermediate states. Computational techniques such as molecular dynamics simulations can be used to characterize protein dynamics by sampling their conformational space. However, the odds a simulation will sample a specific conformation are inversely proportional to its energy, making the discovery of transition states a rare event.

Given the remarkable success of deep generative neural networks in generating believable synthetic images, videos and texts, we designed a neural network that, trained with a discrete set of structures produced via molecular simulations, can generate protein conformations. To ensure the network produces structures respecting physical laws, we also designed a new training procedure whereby we penalise high-energy conformations generated outside of the sampled space. As a result, our network attempts to generate transition paths of minimal energy. To demonstrate the usefulness of our approach, called *molearn*, we successfully challenged it with the prediction of the transition path between known conformations of the bacterial protein MurD.



Read more: Ramaswamy V.K. et al., Phys. Rev. X 11, 011052 (2021)

Free access to molearn: www.github.com/degiacom/molearn

SoftComp partner: Durham University

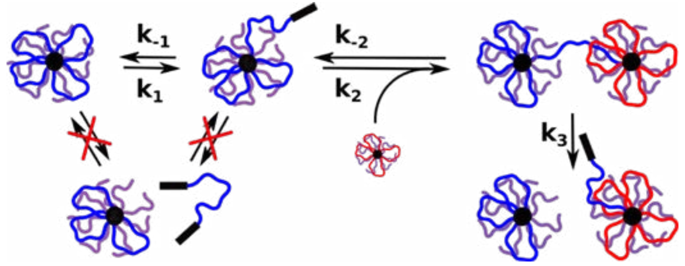
Schematic representation of our modelling pipeline. A neural network trained with an ensemble of protein conformations learns an internal model of their conformational space. This model can then be interrogated to generate new, plausible conformations.

MOLECULAR EXCHANGE OF TELECHELIC POLYMER MICELLES

Telechelic polymers, bearing two hydrophobic stickers in terminal position with a water soluble backbone, are well-studied model systems for self-assembly. Their properties encompass many interesting aspects of soft matter physics – including hierarchical self-assembly, non-Newtonian flow behaviour, and colloidal interactions. Furthermore, telechelic polymers are very important as associative thickeners in products used in daily life, e.g. paints and cosmetics.

In this work, we have investigated the molecular exchange kinetics in mixtures of mono- and difunctionalized telechelic poly(ethylene oxide) n-alkylethers using time-resolved small angle neutron scattering. The results show that, contrary to regular micelles consisting of only monofunctional molecules, the kinetics proceed in a multistep process involving a collision-induced single-molecule exchange mechanism where the rate is directly proportional to the polymer concentration. Based on experimental findings, we have derived a simple kinetic model summarized in the figure above. It consists of three consecutive steps:

Visualization of the exchange mechanism of telechelic chains in flower-like micelles via a sequence of consecutive equilibrium steps. Diffusion of free telechelic chains is excluded.



1. expulsion of one telechelic chain end,
2. insertion into another micelle, i.e. bridging, and
3. release of the second chain end.

A single exponential decay of the relaxation function with an effective rate constant, $k_{eff} \approx k_1\, k_2\, [M]/(2k_{-1})$, that linearly depends on the micellar concentration [M] is in excellent accord with the experimental findings. The discovered collision-induced exchange mechanism is relevant also to other self-assembled structures, in which multivalency plays a role, e.g. in supramolecular networks, lipid membranes, multidomain proteins, lipoproteins, and conventional hydrogels.

Read more: König N. et al., Phys. Rev. Lett. 124, 197801 (2020)
SoftComp partner: Forschungszentrum Jülich – Neutron Scattering and Soft Matter (JCNS-1)

NEW PARTNER & EVENT REPORTS

Soft Matter Experimental & Theoretical Groups @ Universitat Rovira I Virgili in Tarragona

Campus Sescelades, Tarragona, Spain

UNIVERSITAT ROVIRA i VIRGILI

Number of staff: Soft matter experimental group: 6 scientists, 2 postdocs and 7 PhD students; soft matter theoretical group: 1 scientist, 1 PhD and 1 Master's student

Main research topics: Lipid membranes, nanoparticles, polymers, self-assembly, supramolecular chemistry, scaling laws and mean field theory, computer simulations, image analysis, machine learning and artificial intelligence

Methods/infrastructure on offer: Local system of common characterization facilities, fabrication of lasers for photonic interaction with soft matter, Monte Carlo, molecular dynamics of soft matter objects, image analysis platform, big data analysis.

Collaborations with industry: Mitsubishi Chemicals, Unilever, Medcom Advance, DroneAG, NVIDIA, Brytlyt, DeepSea Numerical, Biopharma Group

https://vbaulin.softmat.net/

SoftComp supports dissemination

One of the roles of the SoftComp consortium is to support the dissemination of scientific and technological knowledge among partners and others, and to provide the means to support the training and education of research students. As a result, a stimulating programme of conferences, workshops, laboratory courses, schools, and inter-institute visits is usually organized by SoftComp members regularly and supported by SoftComp year on year. The Covid pandemic has had a drastic impact on this track record in 2020 and 2021: no events could be supported in this period.

SoftComp annual meeting

The yearly Annual Meeting organized by SoftComp did not take place in 2020. In 2021 it came back as a purely online event which was very well attended by 219 participants from 22 countries, nearly double the number of participants of the last regular meeting in 2019. The first virtual SoftComp/EUSMI Annual Meeting 2021 offered more than 110 oral and 20 poster presentations, featuring the two topical sessions, "The Artificial Cell" and "Adaptive & Responsive Materials" as well as an industry session, amongst others.

ANNOUNCEMENTS

The 18th European School on Rheology

4 - 8 April 2022

Leuven, Belgium

The European School on Rheology is an intensive short course designed to give practicing engineers and scientists an understanding of the fundamentals of rheology, its principles of measurement and its application to problem-solving. It is planned to take place as a live event, or – depending on the Corona situation – online.

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https://cit.kuleuven.be/smart/rheoschool

SoftComp Annual Meeting 2022

17 - 19 May 2022

Salerno, Italy

The SoftComp Annual Meeting represents a forum for all SoftComp participants to discuss scientific work accomplished and the implementation of future goals. More information on the meeting will be announced in due course.

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https://eu-softcomp.net/news/meetings/

"Bombannes" 2022 summer school

20 - 28 June 2022

Carcans-Maubuisson, France

The 15th European Summer School on "Scattering Methods Applied to Soft Condensed Matter" offers a one-week high-level training for PhD students and young researchers. Lectures include:

- an introduction to instrumentation and experimental methods in scattering, covering both dynamics and structural aspects,
- scattering theory from data treatment to the inverse scattering problem,
- special topics in the field of soft condensed matter, including microemulsions, biological applications, colloidal aggregation, polymer and polymer processing, and scattering under external constraints.

Pre-registration is open until 20 February.

bombannes@ill.eu
https://workshops.ill.fr/e/bombannes

6th International Soft Matter Conference (ISMC2022)

19 - 23 September 2022

Poznań, Poland

The ISCM2022 will be held under the auspices of SoftComp. Early-registration ends 15 May.

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PERSONALIA & NEWS

Research with neutrons provides unique insights into materials and phenomena that cannot be gained using other methods. In autumn 2021, a ground-breaking project began, aiming to ensure the most effective use of the research potential of neutron methods. The goal of the **Global Neutron Scientists (GNeuS)** project is to train a new generation of highly skilled neutron scientists. The EU is funding the project over its five-year duration with € 3.3 million. The three leading partners, one of them being Forschungszentrum Jülich, are investing a further € 5 million. Within the framework of the project, 45 postdocs will for the first time be able to take part in a 24-month structured, interdisciplinary and cross-sectoral international training programme.

Imperial College London, Durham University, and Procter & Gamble Corp. have received £5.6m in funding from UK's Engineering and Physical Sciences Research Council (EPSRC) Prosperity Partnerships fund for the project **ANTENNA - Advanced tools for predictive cleaning in a world of resource scarcity**. The project, which will run for four-and-a-half years, aims to develop new tools that could transform the design of cleaning products to help make them more sustainable, helping the UK achieve Net Zero by 2050 and meet the complex global challenges of water scarcity, energy consumption and decarbonisation.

Prof. Dr. Patricia M. Bassereau (Institut Curie) is the 2022 recipient of the **Avanti Award in Lipids**. The annual award has been established by Avanti Polar Lipids, Inc., and is presented by the US-based Biophysical Society to an investigator for outstanding contributions to our understanding of lipid biophysics. Bassereau is being recognized for "her stellar work on membrane lipid organization and mechanics". Her research career has focused on biological membranes and their role in numerous cellular processes including protein trafficking between organelles and at the plasma membrane (endo/exocytosis), and the transport of ions and proteins across membranes. Her in vitro assays provided the first dynamic models on how proteins shape membranes and the role of membrane tension in several biological functions.

Dr. Claudia Contini (Imperial College London) was awarded a £15,000 **L'Oréal and UNESCO UK Women in Science Engineering Fellowship** in 2021 to support of a 12-month period of research. The programme is designed to provide flexible and practical financial support, alongside tools and support, for early-career women scientists to pursue their research. Her research aims to set inanimate matter in motion at the nano and microscale, with a focus on the design of synthetic life-like systems that mimic biological properties and functions for biotechnological and biomedical applications, such as drug delivery in the body.

Dr. Yuval Elani (Imperial College London) was awarded the 2021 **Felix Franks Biotechnology Medal** by the British Royal Society of Chemistry Biotechnology Group in recognition of his "meritorious contributions to Chemical Biotechnology". The group described him as "a pioneer in the development and advancement of 'bottom-up' synthetic biology". Yuval's approach has been to develop a series of technologies that allow synthetic cells to be constructed from scratch using biomolecular building blocks, an approach that has led to powerful partnerships with industry - partnerships which are exploiting artificial cells in smart therapeutic devices, for vaccine delivery, and in agritech compound development pipelines.

Prof. Dr. Luis Liz-Marzán (University of Vigo, the CIC biomaGUNE, the Basque Foundation for Science Ikerbasque, and the Centro de Investigación Biomédica en Red Bioingeniería, Biomateriales y Nanomedicina (CIBER-BBN)) has been awarded the **Franco-Spanish Miguel Catalán-Paul Sabatier Prize** 2020 from the French Chemical Society for his important work in colloid chemistry applied to nanoplasmonics, as well as for his collaboration with the French chemical community. This prize, set up in conjunction with the Spanish Royal Society of Chemistry, is awarded in Spain to a French chemist every odd-numbered year. Luis has also been awarded the 2021 **Biomedical Research Award** in the Preclinical Research category for his research in the field of nanoscience and nanomedicine by the Lilly Foundation. Furthermore, Luis has been elected as a **full member of the Spanish Royal Academy of Exact, Physical and Natural Sciences of Spain** in 2021.

Prof. Dr. Geoff Maitland (Imperial College London) has received the **Royal Society of Chemistry (RSC) 2021 Award for Exceptional Service**. The award is one of the RSC 2021 Volunteer Recognition Prizes awarded to those who have given their time and made a significant impact on the British organization. Geoff received his award in recognition of his "outstanding service to the Royal Society of Chemistry through our publishing activities and governance groups". In 2019, he was appointed a **Commander of the Order of the British Empire (CBE)** for "services to chemical engineering following a distinguished career where he drove connections between industry and academia".

Two prestigious awards from the European Colloid & Interface Society (ECIS) went to members of the SoftComp network in 2020: **Prof. Dr. Wilson Poon** (University of Edinburgh) was awarded the **"Colloid & Interface Science Award, sponsored by Solvay"** for his works in the area of colloid and interface science. This prize is granted annually to a European scientist for original scientific work of outstanding quality, described in one or several publications, patents or other documents made public in the previous five years. Prof. **Dr. Peter Schurtenberger** (Lund University) has received the **Overbeek Gold Medal** which is awarded annually to acknowledge excellent careers in, and inspiring contributions to, the field of colloid and interface science.

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Imprint

Published by:
Forschungszentrum Jülich GmbH
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SoftComp Coordinator: Gerhard Gompper
Concept and Editing: Angela Wenzik
Design and layout: Ramona Schurek
Printing: Schloemer & Partner GmbH, Düren, Germany

As of: Feburary 2022

About SoftComp

SoftComp first emerged in 2004 as a Network of Excellence – a tool developed within the 6th Framework Programme of the European Commission – and continued as a self-sustaining Consortium in December 2009, when EU funding came to an end. SoftComp deals with the integration of European research, seeking to strengthen scientific and technological excellence in soft matter. In particular, it aims to establish a knowledge base for the intelligent design of functional and nanoscale soft matter composites, by overcoming the present fragmentation of this important field involved in the development of new materials at the interface of non-living and living matter, where the delicate principles of self-assembly in polymeric, surfactant and colloidal matter prevail. SoftComp has created an integrated team that is able to mobilize European potential in soft matter composite materials and thus disseminate excellence through extensive training and knowledge transfer schemes. SoftComp now consists of 39 research groups in 35 different institutions spread over 12 European countries.

For more information, please visit www.eu-softcomp.net and subscribe to our email newsletter. Or get connected with us on Twitter: @SoftCompNetwork, and LinkedIn: SoftComp Consortium.