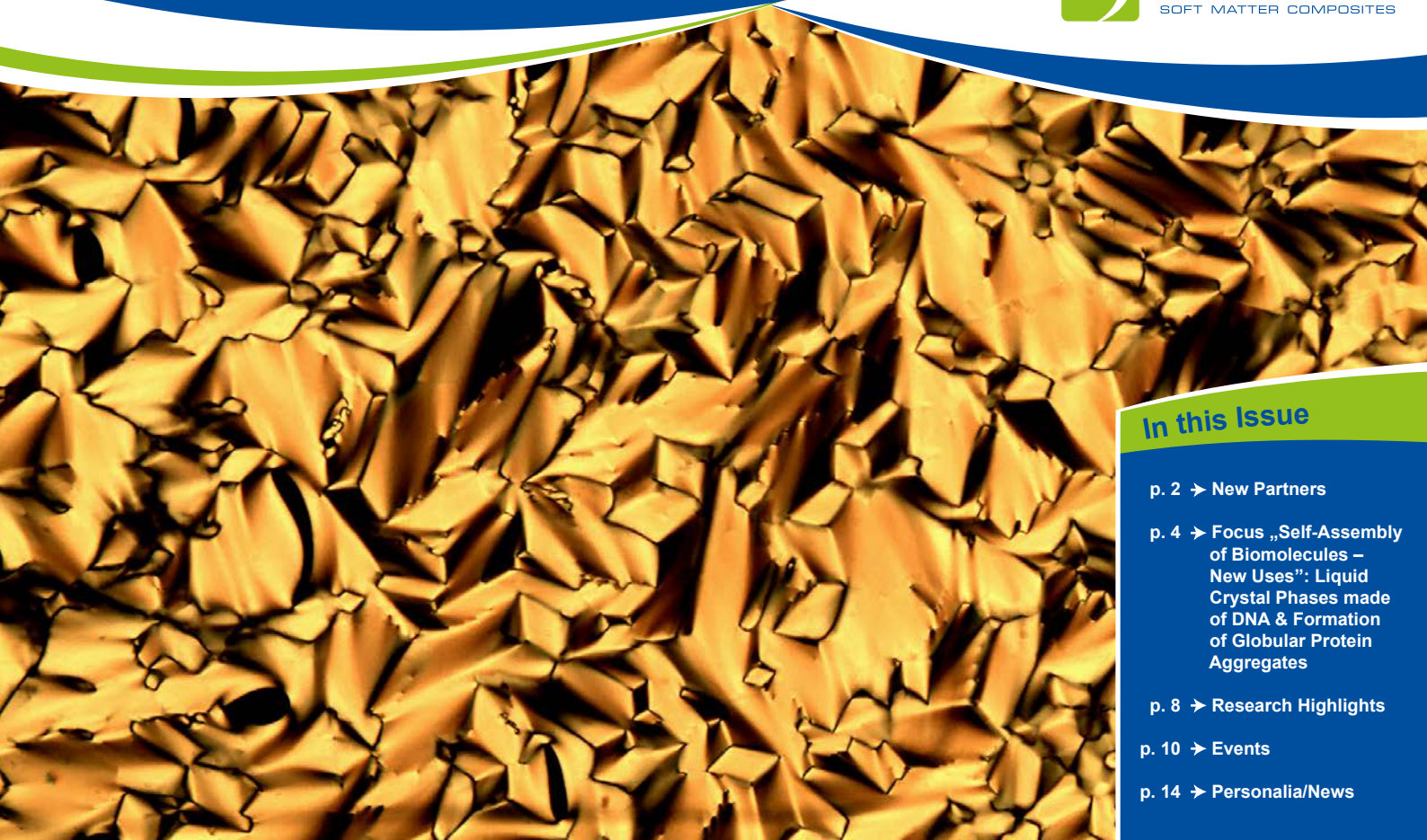
NEWSLETTER

Issue No 15 – 2019

SoftComp
SOFT MATTER COMPOSITES



In this Issue

Editorial

Mankind is currently facing enormous challenges: global warming and the pollution of the environment by microplastics, to name just two crucial ones. Building upon its key competences, SoftComp is well-placed to contribute to their solution.

The optimization and efficient production of polymer solar cells could in the future provide carbon-free alternative energy production. Polyelectrolytes can help to improve batteries. The efficient and clean use of hydrocarbon fuels is already being investigated by SoftComp – think diesel-water-microemulsions.

Polymer materials must in future become more efficient, easier to recycle, or biodegradable. Currently, a large fraction of plastic waste worldwide ends up as microplastics in the oceans. Car tyres – polymer-nanoparticle composites – degrade and significantly contribute to microplastic pollution.

New ideas from the SoftComp community can make a real difference on our journey towards a sustainable future.

Angela Wenzik & Gerhard Gompper

NEW SOFTCOMP PARTNERS

Laboratoire Ingénierie des Matériaux Polymères
UMR 5223 @ University Lyon-St Etienne/CNRS

University Lyon-St Etienne/CNRS, France

- **Number of staff:** 57 permanent researchers, 29 engineers and technicians, 130 PhD students and postdocs
- **Main research topics:** Polymers, from chemistry to object ● Relationships between chemistry, structure, rheology and processing ● Materials in relation to Life Sciences and sustainability ● Physical properties of polymers (transport, electric, mechanical)
- **Methods/infrastructure on offer:** Facilities in material processing (reactive and $ScCO_2$ extrusion, 3D printing, injection, co-kneader, thermoforming…) ● Expertise in the investigation of complex flows in non-equilibrium conditions
- **Collaborations with industry:** More than 50 industrial partners (including: Total, Solvay, Nexans, Elkem, Hutchinson) ● € 6.7 M industrial contracts in 2017 ● One start-up funded (Lactips), 30 employees, € 4 M fundraising in 2017 ● Joint laboratory with the company Total

www.imp.cnrs.fr

Cover picture: Polarized optical microscopy texture of a novel lyotropic liquid crystal phase formed by the self-organization of DNA nanoparticles.
See article on page 4/5 for more information. Picture credits: authors of reference [4]

Soft Matter Experimental & Theoretical Groups @ Ca' Foscari University of Venice

Campus Scientifico Università Ca' Foscari, Venice Mestre, Italy

- **Number of staff:** Soft matter experimental group: 4 scientists, 4 postdocs and 5 PhD students; soft matter theoretical group: 2 scientists, 1 postdoc and 3 Master's students.
- **Main research topics:** Nanoparticles, drug delivery, supramolecular chemistry, computational biology, proteins, DNA
- **Methods/infrastructure on offer:** Local integrated system of common research facilities, noteworthy is a centre for electron microscopy in partnership with the Stevanato Group, featuring a SEM-FEG Zeiss with cutting-edge electro-optical design, a SEM Jeol and a TEM Jeol 300 kV for HREM, all equipped with EDS microanalysis for element-identification, together with all the necessary instrumentation for sample preparation.
- **Collaborations with industry:** Several public and private partners, specifically established partnerships with important international companies such as the Stevanato Group, Luxottica, Holding Fabbrica Italiana Sintetici

www.unive.it/pag/16775/?L=0

Polymer Group, MATEIS @ INSA-Lyon

INSA-Lyon, Villeurbanne, France

- **Number of staff:** 4 Associate Prof., 3 Full Prof., 2 Emeritus, ca. 6 PhD students and 2 postdocs
- **Main research topics:** Structure-property relationships in polymer-based materials (semi-crystalline homopolymers, nanocomposites, block-copolymers, supramolecular networks) ● Metallic glasses
- **Methods/infrastructure on offer:** Range of traction machines ● Range of microscopes in partnership with CLYM (e.g. AFM Veec Dimension V with wide variety of tips; SEM Zeiss SUPRA 55 VP with EDS analysis, EBSD camera), in-situ tensile machine, low vacuum; environmental TEM FEI Titan with accelerating voltage 80-300 kV, aberration corrected, STEM, tomography sample-holder, ultra-fast camera ● SAXS and WAXS apparatus with 2D detector, broadband dielectric spectrometer, low-field solid-state NMR spectrometer, DSC, TGA ● "Atomistic" and "coarse-grained" molecular dynamics simulations + finite elements
- **Collaborations with industry:** Michelin, Renault, EDF and many others
- **Additional comments:** INSA-Lyon is looking for outstanding postdoctoral candidates to apply as Researcher "CR2" to the CNRS.

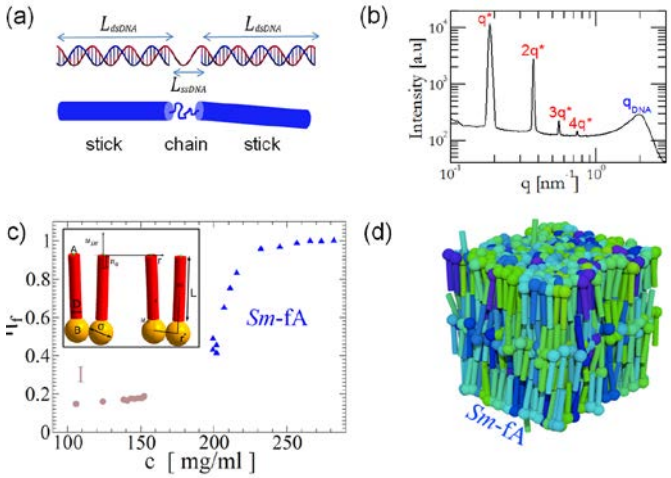
mateis.insa-lyon.fr/fr/content/pvmh

MOLECULAR ENGINEERING OF NOVEL ALL-DNA LYOTROPIC LIQUID CRYSTAL PHASES

The discovery of the double-helical structure of DNA more than half a century ago [1] can be seen as the birth of modern biological sciences. In the early 1980s, Nadrian Seeman took this molecule out of its biological context [2]. By exploiting DNA's powerful base-pair molecular recognition property, Seeman demonstrated its use as a programmable nanoscale building material, laying the foundation for DNA nanotechnology [3].

Here, we present another use of DNA, focusing on the research field of soft matter physics. We propose that DNA can be a versatile building block for fabricating all-DNA particles with engineered shape and interaction potentials that could serve as model systems for exploring unconventional bulk phase behaviour in diverse states of matter. We demonstrate an implementation of the above general idea by presenting a novel lyotropic liquid crystal (LLC) phase [4] formed by the self-organization of all-DNA anisotropic nanoparticles with chain-stick architecture.

Liquid crystals (LC) represent a thermodynamically stable state of matter featuring long-range orientational order but complete or partial absence of long-range positional order. This endows LC with anisotropic optical and mechanical properties, thus allowing them to be classified between isotropic liquids and crystalline solids. Dispersion of short double-stranded DNA (dsDNA) in aqueous



(a) Schematic representation of the G-DNA duplexes with L_{dsDNA}= 48bp (~16.3 nm) and L_{ssDNA}=20 thymine bases. (b) 1D-SAXS profile for the G-DNA duplex. (c) Fraction of folded G-DNA η_f as a function of concentration (I: Isotropic). Inset: The model for G-DNA used in the Monte Carlo simulations. (d) Snapshot of the Sm-fA.

Picture credits: authors of reference [4]

by Emmanuel Stiakakis (left), Forschungszentrum Jülich, Germany, e.stiakakis@fz-juelich.de and Cristiano de Michele, Sapienza University of Rome, Italy, cristiano.demichele@roma1.infn.it

Pictures: authors

solutions is a well-known system that exhibits multiple LLC ordered phases at sufficiently high DNA concentrations [5]. The main reasons are rooted in the DNA's characteristic base stacking and helical architecture, which confer dsDNA molecules with shape anisotropy, chirality and an unusual stiffness with a persistence length l_p^{dsDNA} of about 50 nm (~150 base pairs).

In the present study, we exploit the large difference in the persistence length between dsDNA and single-stranded DNA (ssDNA, l_p^{ssDNA}~2nm) in order to construct an all-DNA chain-stick molecule, consisting of a gapped DNA (G-DNA) duplex – with a contour length near the dsDNA's persistence length – where two stiff blunt-ended dsDNA segments of equal length are connected by an ssDNA flexible spacer (Fig. (a)). Through a combined experimental (Fig. (a, b), title image of this newsletter) and numerical study (Fig. (c, d)), we provide unambiguous evidence of the formation of a smectic-A phase in the aqueous suspensions of all-DNA chain-sticks (Fig. (b, c)).

Surprisingly, our results reveal that the gapped duplexes attain a folded conformation in this two-dimensional fluid layers mesophase, with the vertically aligned molecules having a long molecular axis almost perpendicular to the layer plane (Fig. (c, d)). The good agreement between numerical and experimental results enables us to identify the mechanisms which are key to the formation and thermodynamic stability of this novel LLC phase, which we designate as a "smectic-fA phase" (where the "f" stands for "folded"). We argue that the new liquid crystal phase formed in these all-DNA chain-sticks is a combined result of an entropy-driven (excluded volume reduction) self-assembly and the presence of weak attractive stacking interactions between the duplexes' blunt-terminal ends.

Our study shows that DNA, as a building block, can offer an exquisitely tunable means to engineer a potentially rich assortment of LLC that can be precisely designed on the sub-nanometer level.

References

[1] J. D. Watson and F. H. Crick, Nature 171, 737 (1953).

[2] N. C. Seeman, J. Theor. Biol. 99, 237 (1982).

[3] N. C. Seeman and H. F. Sleiman, Nat. Rev. Mater. 3, 17068 (2017).

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[5] K. Merchant and R. L. Rill, Biophys. J. 73, 3154 (1997).

FORMATION AND USE OF GLOBULAR PROTEIN AGGREGATES

Globular protein aggregates are used to texture aqueous systems either as gelling agents, viscosifiers or stabilizers of emulsions, e.g. in the food and cosmetics industries. Globular proteins are characterized by a rather rigid, compact and well-defined structure. In aqueous solutions, their net charge density varies from a large positive value at low pH to a large negative value at high pH, and is zero at the so-called iso-ionic point (pI). Electrostatic repulsion stabilizes aqueous solutions of native globular proteins, but when solutions are heated, the peptide chains become more mobile which allows strong bond formation between the proteins. As a consequence, heated globular protein solutions often aggregate irreversibly.

Aggregates with three different morphologies occur depending on the conditions [1]. Aggregates consisting of randomly connected relatively thin strands result from strong electrostatic repulsion. The size of these fractal aggregates at steady state increases with the protein concentration until, at a critical gel concentration, the aggregates percolate and form a system-spanning network. At a given concentration, larger aggregates emerge if the electrostatic repulsion between proteins is weaker, either because the net charge density is lower or because salt has been added.

We have shown that relatively dense roughly spherical microgels with radii between 50 and 200 nm occur if the net charge density of the proteins is below a critical value either close to pI or in the presence of divalent cations. Under most conditions, the microgels randomly stick together and either precipitate or, at higher concentrations, form a gel. However, within narrow pH ranges around pI or a narrow range of Ca^{2+} concentrations, stable suspensions of microgels arise. Finally at pH ≤ 2.5, the proteins hydrolyze into smaller peptides, which subsequently assemble into rigid fibrils.

In recent years, we have investigated the viscosifying and gelling properties of protein aggregates. Large fractal protein aggregates have a low density and can be used as viscosifiers, as the viscosity of suspensions of such aggregates increases rapidly with increasing concentration [2]. On the other hand, microgels of the same size are dense and can therefore be used to increase the protein content

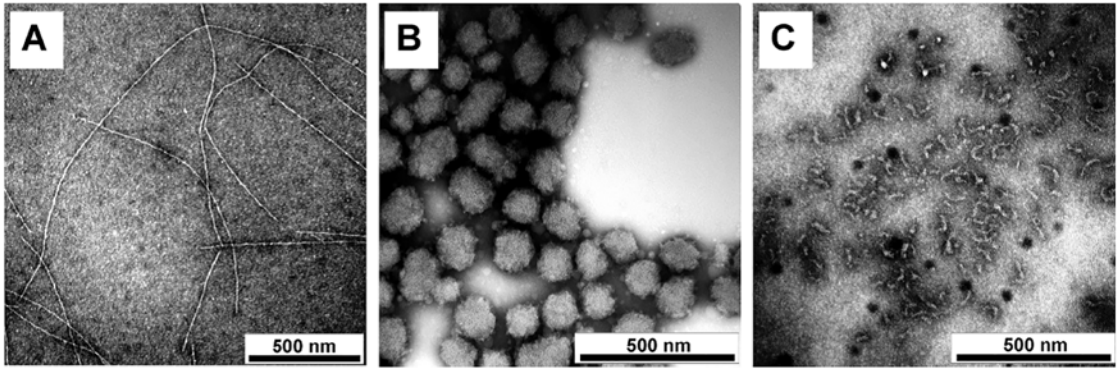
Negative-staining TEM images of β–lg aggregates formed at pH 2.0 (A), pH 5.8 (B) and pH 7.0 (C). Reproduced with permission from ref. [1].

by Taco Nicolai & Christophe Chassenieux, IMMM UMR-CNRS 6283, University of Le Mans, France,
Taco.nicolai@univ-lemans.fr & christophe.chassenieux@univ-lemans.fr

Picture: University of Le Mans

of products without significantly increasing the viscosity. Contrary to native proteins, aggregates formed at a steady state are stable when heated and therefore resist pasteurization. However, the aggregates associate and may form a gel when the electrostatic repulsion is reduced either by bringing the pH closer to pI or by adding salt [3]. It can be induced at low temperatures contrary to native proteins though the rate of this process decreases with decreasing temperature. Therefore, it is sometimes termed cold gelation; this can also occur in suspensions of microgels, but for a given protein concentration, stiffer gels are formed with fractal aggregates.

Protein aggregates can also stabilize oil-in-water emulsions and foams [4]. Due to their particle character, aggregates provide greater stability than native globular proteins. This is particularly striking for water in water emulsions formed by mixing aqueous solutions of incompatible polymers that cannot be stabilized by native proteins, but we have found that it can be done with protein aggregates. [5].



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[1] J. M. Jung et al., Biomacromolecules 9, 2477 (2008).

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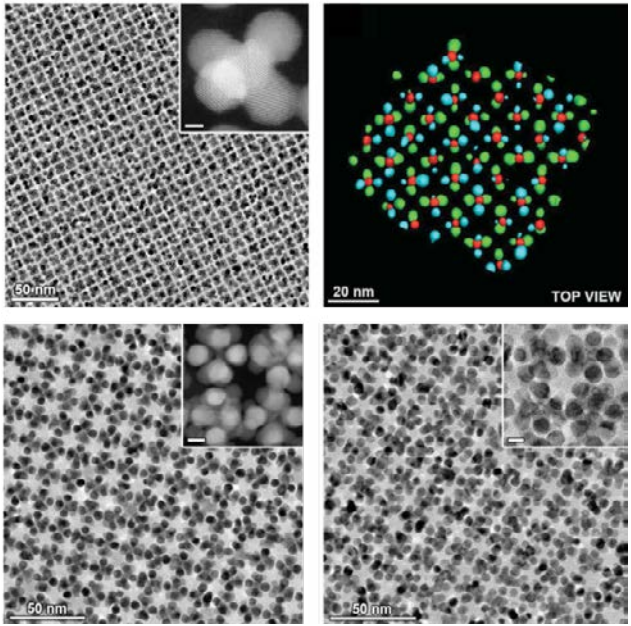
[4] E. Dickinson, Food Hydrocolloids 68, 219 (2017).

[5] A. Gonzalez-Jordan, L. Benyahia, and T. Nicolai, Langmuir 32, 7189 (2016).

NON-CLOSE-PACKED NANOPARTICLE ARRAYS: POROUS MATERIALS WITH NOVEL CRYSTAL STRUCTURES ASSEMBLED FROM NANOPARTICLES

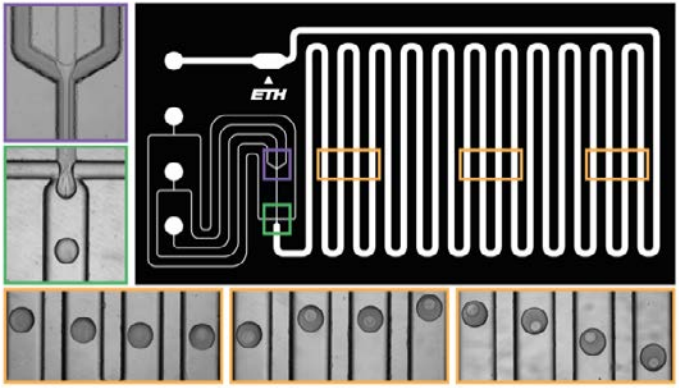
The self-assembly of inorganic nanoparticles has been used to prepare hundreds of different colloidal crystals, but almost invariably with the restriction that the particles must be densely packed. Here, we show that non-close-packed nanoparticle arrays can be fabricated through the selective removal of one of two components comprising binary nanoparticle superlattices.



First, a variety of binary nanoparticle superlattices were prepared at the liquid-air interface, including several arrangements that were previously unknown. Molecular dynamics simulations revealed the particular role of the liquid as a template for the formation of superlattices not achievable through self-assembly in bulk solution. Second, upon stabilization, all of these binary superlattices could be transformed into distinct “nanoallotropes” – nanoporous materials having the same chemical composition but differing in their nanoscale architectures.

Read more: Udayabhaskararao T. et al., Science 358, 514 (2017).
SoftComp partners: CIC biomaGUNE/University of Antwerp

The research paper reveals the potential to further expand the extensive family of nanostructured materials.



Micrograph showing the microfluidic chip used to create designer emulsions. Insets: First flow focusing device (top left) creating contact between the inner and middle phase. Middle left: flow focused on generating double emulsion droplets. Bottom row: gradual growth of the inner droplet.

Picture: Iacopo Mattich/ETH Zurich

DESIGNER EMULSIONS

Recent years have seen an increase in the study of emulsions and bubbles with complex structured interfaces. Pickering emulsions, Ramsden foams or polymer coated capsules are just a few examples of where the exceptional properties of these multiphase materials are derived from the structure at the interface. These systems have promising high-end applications. Several research groups have also embarked on the detailed characterization of the thermodynamic and rheological properties of the interface to understand structure property relations. So far it has been difficult to connect the fundamental studies of interfacial properties and constitutive modelling as it was not possible to make drops with controlled surface coverage and composition.

In a recent collaboration between the soft materials and complex groups at ETH Zurich and researchers at KU Leuven, we developed a generic and versatile method to create designer liquid-liquid interfaces, using transient double emulsions. Exploiting phase diagrams or slow miscibility, a transient double emulsion approach leads to unprecedented control over the composition and coverage of the final interface. Our method is suitable for particles, but provides good control for types of emulsions stabilized by insoluble Langmuir layers. The result is expected to be both of practical importance, for instance in the design of new materials, and should also help with our understanding of fundamentals such as coalescence. Last but not least, this is a good example of functional soft matter by design.

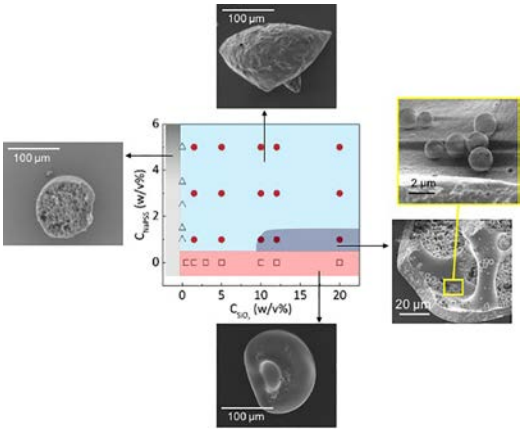
Read more: G. Dockx et al, Nat. Commun. 9, 4763 (2018)
SoftComp partners: ETH Zurich/KU Leuven

NANOCOMPOSITE CAPSULES WITH DIRECTIONAL, PULSED NANOPARTICLE RELEASE

The precise spatio-temporal delivery of nanoparticles from polymeric capsules is required for applications in wide-ranging fields from medicine to materials science. Facile and robust approaches for nanocomposite capsule fabrication, exhibiting a triggered nanoparticle release, remain however elusive due to the complex links between polymer-nanoparticle phase behaviour, diffusion, phase inversion and directional solidification.

Droplet extraction provides an attractive route to fabricate a range of spherical and anisotropic polymer nanoparticle capsules with a controllable internal microstructure. The assembly mechanism is founded on the engineering of the thermodynamics of mixtures, de-mixing and coarsening, phase inversion, and directional solidification during solvent extraction.

We demonstrate that microporosity and capsule morphology can be precisely controlled without resorting to complex synthetic routes. We investigate a model system of polyelectrolyte sodium poly(styrene sulfonate) and 22-nm colloidal silica and demonstrate a robust capsule morphology diagram, achieving a range of internal morphologies, including nucleated and bicontinuous microstructures, as well as isotropic and non-isotropic external shapes.



Upon dissolution in water, we find that capsules formed with either neat polymers or neat nanoparticles dissolve rapidly and isotropically, whereas bicontinuous, hierarchical, composite capsules dissolve via directional pulses of nanoparticle clusters without disrupting the scaffold, with time scales tuneable from seconds to hours. The versatility, facile assembly, and response of these nanocomposite capsules thus show great promise in terms of precision delivery.

Read more:
Udoh E. et al., Sci. Adv. 3, eaao3353 (2017)
SoftComp partner:
Imperial College London

Phase map and accompanying SEM images of the shape and internal structure of polymer-silica composite capsules, as a function of NaPSS and SiO_2. See the unabridged image caption on www.eu-softcomp.net for details.

A scene from the AERC conference dinner at a historic restaurant in Sorrento.

Picture: local committee

AERC 2018 in Sorrento: A Scientific Success!

The Annual European Rheology Conference (AERC) took place in Sorrento, Naples, Italy from 17 - 20 April 2018. It was organized by Profs. Mario Minale, Giovanni Ianniruberto and Stefano Guido, together with a young local committee affiliated with the University of Naples Federico II and the University of Campania “Luigi Vanvitelli”.

It was a great success in terms of participation as well as scientific quality and breadth of topics covered. More than 600 abstracts were submitted, 570 delegates attended the conference, and roughly 140 papers from groups outside Europe were presented. More than 95 students attended the Rheology course “Particles, Active Matter, Confinement and Viscoelasticity: the microfluidics playground”, taught by Pier Luca Maffettone, Amy Shen and Julia Yeomans.

The conference was organized into seven parallel sessions and twelve symposia, covering the main topics of interest in the rheology community, from classical blends such as suspension and polymer melts to geofluids and living matter. Three plenary speakers (Mike Cates, Michel Cloitre and Fred MacKintosh) presented outstanding work of particular interest to the conference delegates. AERC 2018 was sponsored by a range of companies (TA Instruments, Anton Paar, Malvern Panalytical, ExxonMobil and Mario Penati Strumenti). Various exhibitors (TA Instruments, Anton Paar, ThermoFisher, Incipientus, Bruker, LS Instruments, Malvern Panalytical, Springer) displayed their products at the main entrance of the venue for the whole period of the conference. The best posters and oral communications were awarded prizes thanks to the kind support of Procter & Gamble, Soft Matter and Applied Science.

We look forward to enjoying the same success in Portorož, Slovenia at the next AERC!

by R. Pasquino

Ring Polymers Workshop 2017 in Hersonissos: Future Research Perspectives

Ring polymers have emerged as an extraordinary topic at the forefront of soft matter research. They have substantial implications for polymer physics, e.g. unusual stress relaxation, no entanglement plateau, viscosity modification in ring-linear polymer mixtures, and also for biology, for instance in terms of the structure-dynamics of chromosome territories, as well as DNA structure and flow. SoftComp has led recent developments through the discovery of the role of ring purity and novel studies on rheology and the short-time diffusion of rings and ring-based mixtures. The Crete and Jülich groups have been particularly active and are collaborating with the world-leading Rubinstein theory group (Duke University).

The three groups organized the Ring Polymers Workshop in Hersonissos, Crete, from 25th - 27th September 2017. The format incorporated invited and contributed (oral and poster) presentations and ample time for both formal and informal discussions. Invited speakers included Grosberg (NYU), McKenna (Texas Tech), Grayson (Tulane), Pyckhout-Hintzen (Jülich), Foster (Akron), Watanabe (Kyoto), Shanbhag (West Florida), Jung (Seoul), Everaers (Lyon), Mavrantzas (Patras), Likos (Vienna), Meyer (Strasbourg), Michieletto (Edinburgh), Sakaue (Nagoya), Floudas (Ioannina), Krutyeva (Jülich), Tezuka (Tokyo), Michieletto (Edinburgh).

The main conclusions from the lively discussions are summarized below and constitute future perspectives:

- Link to biology: Loop extrusion; contact statistics and folding; random localization
- DNA as model ring polymer: Self-diffusion in different environments; nonlinear deformation and molecular individualism
- Experiments synthetic rings: Need for high-molar mass rings with high purity in sufficient amounts; purification of rings; ring-based topologies and characterization; slow modes and scaling of viscosity with molar mass
- Mixtures with rings and threading: Quantify threadings, ring-linear and ring-ring; dynamics of ring-linear blends; topological glass
- Conformation of rings: Universality class for compressed objects; prediction of dynamic structure factor; ring brushes
- Microfluid separation of rings and linear polymers
- Nonlinear deformation: Anisotropic form in extension of ring in linear matrix, tube diameter; peak in stress growth coefficient, linearring withdrawal; nonlinear shear
- Confinement effects and thin films: Affinity to solid substrate, role of free surface Tg and thickness dependence
- Role of knots: Permanent knots and segmental dynamics; non-permanent knots, analysis and response to flow
- Rings as ultrasoft colloids: Structure, cooperativity of motion

by D. Vlassopoulos

Participants of the Ring Polymers Workshop 2017 in Hersonissos

Picture: A. Larsen, FORTH

Motile Active Matter: Nanomachines, Microswimmers, and Swarms

February 25th – March 1st, 2019

Jülich, Germany

Active matter is a novel class of nonequilibrium materials composed of a large number of agents, which consume energy and generate directed motion. This winter school is intended for students at the Master's and PhD level, and postdocs.

spp-microswimmers@fz-juelich.de
www.fz-juelich.de/ics/microswimmers

50th IFF Spring School: Scattering! Soft, Functional and Quantum Materials

March 11th – 22nd, 2019

Jülich, Germany

The goal of this school is to enable students and young researchers to apply the entire tool box of advanced scattering methods to their topical research in order to provide them with otherwise unobtainable microscopic information.

springschool@fz-juelich.de
www.iff-springschool.de

Edible Soft Matter

April 17th – 19th, 2019

Le Mans, France

This SoftComp topical workshop aims to bring together the Soft Matter and Food Science communities.
Deadlines:
Abstract submission: January 21st, 2019
Registration: April 1st, 2019

christophe.chassenieux@univ-lemans.fr
https://ediblesoftmat.sciencesconf.org

5th International Soft Matter Conference (ISMC2019)

June 3rd – 7th, 2019

Edinburgh, United Kingdom

The conference is organised around the following topics:

- Active Soft Matter
- Arrested Soft Matter
- Colloidal and Granular Soft Matter
- Interfacial Soft Matter
- Living Soft Matter
- Stressed Soft Matter
- Polymeric Soft Matter
- Making and Measuring Soft Matter
- Processing Soft Matter
- Self-assembled Soft Matter

Abstract submission: March 1st, 2019
Registration: May 17th, 2019

ines.foidl@ed.ac.uk
www.ismc2019.ed.ac.uk

SoftComp Annual Meeting 2019

October 8th – 10th, 2019

Ancona, Italy

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

f.carsughi@fz-juelich.de
https://eu-softcomp.net/news/meetings/

The SoftComp partner **Center for Cooperative Research in Biomaterials** (CIC biomaGUNE) has been recognized as a Maria de Maeztu Unit of Excellence by the State Research Agency of Spain. The Maria de Maeztu accreditation seeks to acknowledge excellent research centres that are counted among the best internationally in their respective fields of research. Being recognized as a María de Maeztu Unit of Excellence is the highest accolade of scientific excellence awarded in Spain.

Representatives of eight European research infrastructures have signed the Charter of the **League of advanced European Neutron Sources (LENS)** at the International Conference of Research Infrastructures, ICRI2018, in Vienna. The signing ceremony marks the establishment of a new strategic consortium of European neutron source facilities with the aim, according to the charter, to "facilitate any form of discussion and decision-making process that has the potential to strengthen European neutron science via enhanced collaboration among the facilities". The SoftComp member Forschungszentrum Jülich is also a partner of one of the infrastructures involved, the Heinz Maier-Leibnitz Zentrum in Garching, Germany.

Prof. Dr. Juan Colmenero (University of the Basque Country) has been awarded the 2017 Walter Hälg Prize. This is presented biannually by the European Neutron User Community (ENSA) to a European scientist for outstanding, coherent work in neutron scattering with a long-term impact on scientific and/or technical neutron scattering applications. According to ENSA, the most outstanding contribution of Juan Colmenero in the field of neutron scattering in conjunction with complex materials such as polymers or soft matter in general was the creation of a pioneering, unique and robust scientific methodology based on the combination of neutron scattering with different spectroscopic methods and molecular dynamics (MD) simulations.

Dr. Valeria Garbin (Imperial College London) is the 2018 recipient of the McBain Medal. The medal is awarded annually by the British Royal Society of Chemistry (RSC)/Society of Chemical Industry (SCI) Joint Colloids Group to recognize a rising star in colloid and interface science. Dr. Garbin's research programme focuses on fundamental aspects of microscale transport phenomena in soft and biological matter. Her team has performed the first measurement of steric interactions between nanoparticles at fluid interfaces, discovered new mechanisms of the removal of nano-

particles from fluid interfaces, and pioneered the use of optical tweezers to manipulate biocolloids for ultrasound medical imaging.

Dr. Barbara Gold (formerly Forschungszentrum Jülich, now ETH Zurich) has been awarded an Excellence Prize by Forschungszentrum Jülich. The award honours outstanding doctoral theses written mainly in Jülich, combined with excellent achievements during the subsequent postdoctoral phase of up to two years. It is endowed with prize money of € 5,000. During her doctorate, Gold successfully attributed the mechanical behaviour of supramolecular polymers to underlying microscopic processes – an important aspect for the development of tailored plastic materials.

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 an ERC Advanced Grant by the European Research Council. The project entitled "Four-Dimensional Monitoring of Tumour Growth by Surface Enhanced Raman Scattering" led by Liz-Marzán will be funded with € 2.4 million over five years. It will deal with the design of materials and methods that allow a study in real time of tumor growth in controlled environments, built from specially designed scaffolds. The use of surface enhanced Raman spectroscopy (SERS) is expected to overcome the limitations of currently used techniques, in particular those related to the ability of observing deeper regions in the tissue. An additional advantage of SERS is that it will allow fundamental studies of tumour growth, without the need for animal experiments. The researchers anticipate that the generated knowledge will facilitate the identification of new drugs that are more effective against cancer and will avoid the side effects of current chemotherapy.

Dr. Benedikt Sabass (Forschungszentrum Jülich) was presented with one of two Young Investigators Awards by the German Biophysical Society, DGfB, at its Biennial Meeting 2018 in Düsseldorf. For his lecture on research into understanding the micromechanics of bacteria, he was awarded prize money as well as funding for a research stay at the Chair of Molecular Physical Chemistry at Heinrich Heine University in Dusseldorf.

Dr. Astrid Schneidewind (Forschungszentrum Jülich, outstation in Garching) was appointed the new Chair of the 11th Committee for Research with Neutrons (KFN). KFN represents all the scientists in Germany who work with neutrons or who are closely connected with neutron research.

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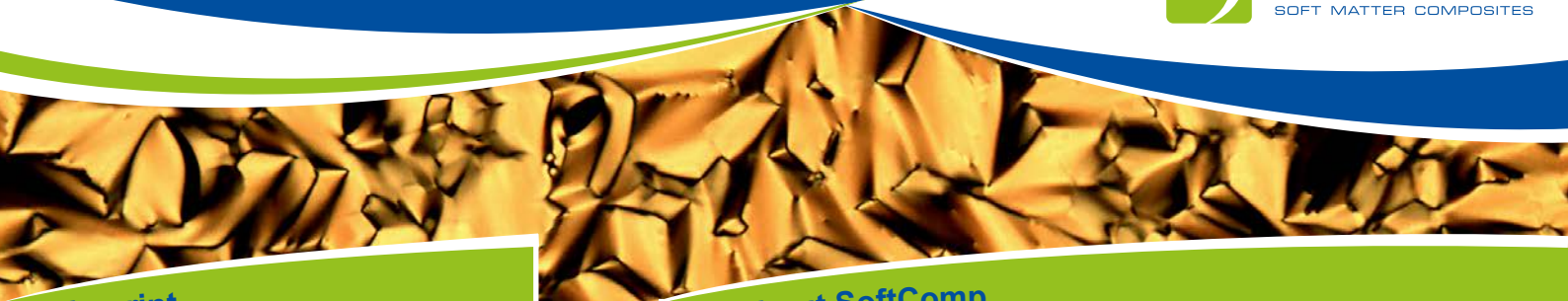

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About SoftComp

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. Please visit our website for more information or to subscribe to our email newsletter: www.eu-softcomp.net/