SoftComp
SOFT MATTER COMPOSITES
Network of Excellence
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newsletter
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Editorial

The SoftComp Newsletter intends to inform readers about new methods and approaches, as well as new challenges and results in thefield of soft matter science and its applications.

The growing interest in nano-structured materials calls for local measurement techniques. The first article of this issue describes the newly developed technique of nano-dielectric spectroscopy that allows both molecular mobility tobe imaged and dielectric spectroscopy data tobe obtained at a single location of a sample with nanometre resolution.

Melts of ring polymers present endless challenges and are among the most fascinating topics in polymer physics today. This is be-cause the ends of linear and branched polymer chains determine almost all basic properties of conventional dense polymer systems, but are completely absent from ring polymers.Thus, these cyclic objects allow fundamental assumptions of polymer physics tobe tested in an unambiguous manner. The second article demonstrates that only a combination of complementary techniques can meet these "endless challenges".

The role as network coordinator was handed over from Prof. Dieter Richter to Prof. Gerhard Gompper as of May 2012. Dieter Richter steered SoftComp very successfully through many stages of its development, from the start as a European Network of Excellence, through the transformation into a self-supporting structure and into the present association of many European soft matter labs. We are very happy that Dieter Richter will remain an active partner in the network in coming years .

Finally, we would like to take this opportunity to wish you all a happy and successful New Year.

Hugo Bohn & Gerhard Gompper

In This Issue

Probing locally molecular dynamics: imaging an nanodielectric spectroscopy

Luis A. Miccio[1,2], Mohammed M. Kummali[1,3], Gustavo A. Schwartz[1], Angel Alegría[1,3], Juan Colmenero[1,2,3]

[1]Centro de Física de Materiales CSIC-UPV/EHU, Paseo Manuel de Lardizabal 5, 20018 San Sebastián, Spain.
[2]Donostia International Physics Center, Paseo Manuel de Lardizabal 4, 20018 San Sebastián, Spain.
[3]Departamento de Física de Materiales UPV/EHU, Fac. de Química, 20080 San Sebastián, Spain.

During the last few decades, broadband dielectric spectroscopy (BDS) has proven to be a very useful technique in the study of the molecular dynamics of materials. The huge frequency range achieved *(10^{-5}–10^{12} Hz)* and the possibility of measurements under different temperature, pressure, and environmental conditions allows the observation of a large variety of processes with very different time scales. Within this extraordinary experimental window, molecular and colletive dipolar fluctuations, charge transport and polarization effects take place, in turn determining the dielectric response of the material under study. However, in the last few years, growing interest in nanostructured materials highlighted the need for local measurements.

Figure 1

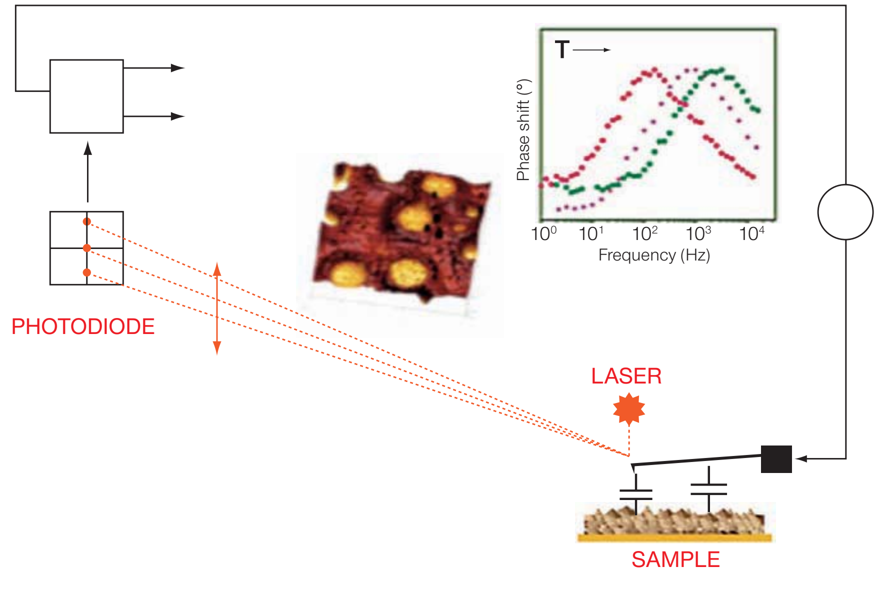

Fig. 1. AM-EFM implementation scheme. The cantilever oscillation is detected in the photodiode. The resulting signal whos frequency is twice as high as that of the applied AC voltage is analyzed in the LIA, and both amplitude and phase can be used to obtain images or spectra of the molecular dynamics. The probe-sample system can be modeled as two capacitances in parallel, tip-sample and cantilever-sample, respectively (see figure).

Probing locally molecular dynamics: imaging and nano-dielectric spectroscopy (continued)

Figure 2

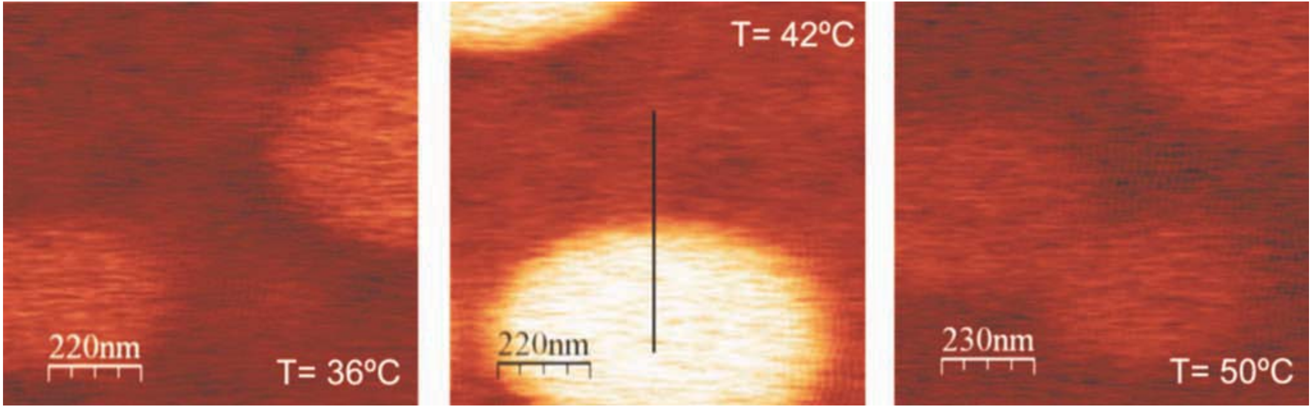

Fig. 2. Phase images (at 50 Hz) of PS/PVAc (75/25 wt%) sample at different temperatures. Brighter areas correspond to higher losses, indicative of a few ms segmental relaxation time of PVAc.

Recently, the electric interaction between the probe of an atomic force microscope (AFM) and the material under study was used to develop a new technique: nanodielectric spectroscopy (*n*DS). Within this approach, the electrical interaction obtained after applying an AC voltage to the probe is used to reveal information about the dielectric relaxation processes within the material. Therefore, this technique combines the capability of sensing the molecular dynamics of BDS with the spatial resolution provided by AFM.

Figure 3

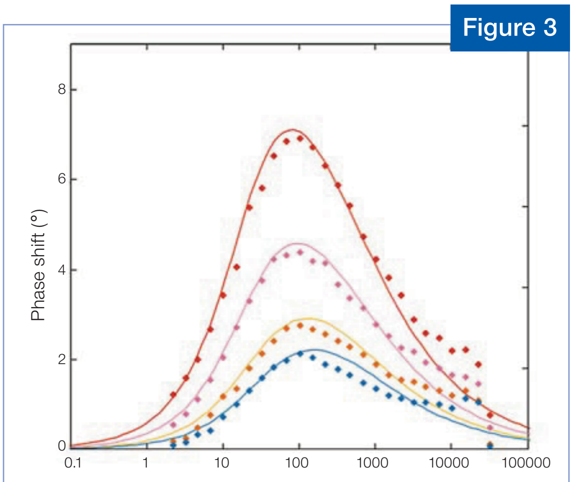

Fig. 3 nDS phase-shift spectra of a PVAc island at tip-sample distances ranging from 11 to 125 nm. At smaller tip-sample distances, the peak intensity is higher and the cantilever contribution is negligible. The lines were obtained by the two capacitor model shown in Fig. 1.

Like any other AFM technique, this approach allows the materials to be imaged: topography, mechanical properties, and additionally dielectric interaction. The force resulting from the interaction of the tip with the polarizable entities in the material can be evaluated by modeling the tip-sample system as a capacitor (capacitance *C*). When a voltage, *V*, is applied the resulting electrostatic potential energy is $W=\frac{1}{2}CV^2$ and the corresponding electrostatic force acting on the tip $F_e=dW/dz$, being the coordinate along which the tip sample distance is measured. Thus, F_e is proportional to the square of the applied voltage, and consequently when a sinusoidal voltage is applied to the AFM tip $[V(t) = V_0 \sin(\omega_e t)]$, the corresponding force component will be a sinusoidal function with a frequency double than that used in the excitation $[F_e(t)= \partial C/\partial z \sin(2\omega_e t+\phi)]$. The force amplitude depends both on the experimental conditions and on the dielectric properties of the material under investigation, whereas depending on the cantilever characteristics as well as on the dissipative electrical processes in the material. Therefore, by detecting the tip motion component at the second harmonic of the AC excitation voltage, local information about the dielectric relaxation in the materials under investigation can be obtained. This method is known as *amplitude modulation electric force microscopy* (AM-EFM) and requires the signal from the AFM photodiode to be analyzed with a lock-in amplifier (LIA) in order to obtain both the amplitude and phase of the tip motion. In the case of a loss-free dielectric material, the signal amplitude provides information on the dielectric permittivity, which is frequency in-dependent. However, when dielectric relaxation takes place in the material the dielectric permittivity becomes frequency dependent and a corresponding dielectric loss process appears, which in turn results in a complex capacitance C^* in the equation above.

Figure 1 shows a scheme of the implementation of this approach. The experiment is generally performed by a double-pass method. First, the tip-sample distance (or sample topography) is established precisely by a standard 'tapping' (intermittent contact) experiment. Subsequently, the driving tip amplitude is drastically reduced to maintain a predetermined tip-sample distance and the tip motion generated by the application of an alternating voltage is analyzed. In this way, it is possible either to obtain images of the molecular dynamics at selected frequencies along the surface of the sample, or to probe the dielectric relaxation locally in the available frequency range at specific sample locations, which can be referred to as nanodielectric spectroscopy, nDS.

Proof of concept experiments have been performed on thin film polymer blends of 25 wt% polyvinyl acetate, PVAc, (a polymer showing a prominent dielectric relaxation) and 75 wt% polystyrene, PS, (which do not show detectable dielectric relaxation in the explored temperature range). The PVAc/PS system is immiscible and the blends show phase separation with PVAc islands of hundreds of nanometers in size. In a first experiment, measurements at different temperatures were performed by detecting the variations of the phase of the electrical force along the sample at different temperatures. Figure 2 shows the results where it is clear that the electrical phase contrast is weak at low and high temperatures, but passes through a maximum at intermediate temperatures (showing the areas where PVAc molecular mobility takes place with a time scale in the order of the reciprocal in the frequency of the applied electric voltage). The images obtained in this way present a lateral resolution (measured along the line in Figure 2) of about 20-30 nm, which is close to the theoretical limit given the radius of the tip (20 nm).

In a second experiment at T=320 K, the dielectric relaxation on the center of a big PVAc island was measured using different tip-sample distances ranging from 11 nm to 125 nm. Figure 3 shows the frequency-dependent phase (the zero phase is determined by performing a similar experiment on an area where the surface of the conductive gold film used as the lower electrode is accessible). It is clear that at this temperature segmental motions in PVAc occur at a rate that matches the accessible frequency window as evidenced by the detected peak. When the tip sample distance increases the peak intensity decreases, with a concomitant small peakshift to higher frequencies. An analysis of the signal by modeling the probe-sample electric interaction as a superposition of two contributions (see Figure 1), one from the tip [assuming a cone shape terminated in a semisphere 3] and the other from the cantilever (modeled as due to a parallel plate capacitor), quantitatively accounts for these experiments[4]. From this analysis it is evident that at relatively large tip sample distances the cantilever-related component becomes very relevant and consequently the local character of the method is lost. Therefore, using the method will require the tip sample distance to be kept small, so the signal amplitude (signal-to-noise ratio) increases and the actual local dielectric relaxation from the sample can be accurately determined.

In Figure 4 the results of nDS experiments preformed in two locations close to a PVAc/PS interface are presented. Since the data collected from point 2 does not show contributions from the PVAc island, it becomes clear that the size of the probe area can actually approach the theoretical limit.

Figure 4

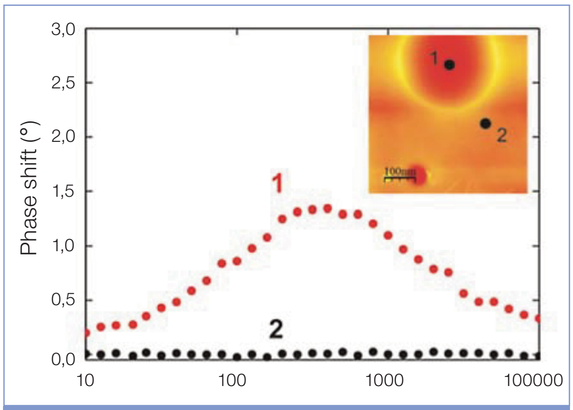

Fig. 4 Comparison between the nDS phase-shift spectra acquired at locations 1 and 2 (see inset) in the close vicinity of the PVAc/PS interface.

In summary, nDS is a new technique that allows dielectric spectroscopy to be performed at a single location of a sample, covering about 5 decades in frequency. In addition, the proposed method can be performed with a standard AFM instrument, working under room conditions. The obtained spectra can be related to the dielectric properties of the material through the application of a rather simple model. On the other hand, it is possible to image the dynamics of materials by fixing the electric voltage frequency. Therefore, studies of the local dielectric response of biological, reinforced or other soft matter materials appear as the next challenges for this technique. Also, possibilities for extending the accessible frequency range using higher modes of the cantilever oscil-lation are foreseen. Last but not least developments for a user-friendly interface are in progress in the framework of the European Soft Matter Infrastructure (ESMI)[5] project, which will eventually allow a broad community to access these methods.

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5. http://www.esmi-fp7.net/

International Soft Matter Conference 15-19 September 2013, Rome, Italy

This conference will bring together all scientists interested in soft matter systems such as colloids, polymers, surfactants, membranes, bio-materials and their composites. It is the third conference of the ISMC series and it is organized on the campus of "Sapienza Universita' di Roma" under the auspices of the NoE SOFTCOMP. The previous two conferences were held at Aachen (2007) and Granada (2010).

The plenary and invited speakers, divided according to the eight main topics, are:

BIOLOGICAL SOFT MATTER
Amos Maritan (Università di Padova, Italy), Plenary
Dennis Discher (University of Pennsylvania, USA)
Jean-François Joanny (Institut Curie Paris, France)
Felix Ritort (Universitat de Barcelona, Spain)
G.V. Shivashankar (National University of Singapore, Singapore)

COLLOIDS
Clemens Bechinger (Universität Stuttgart, Germany), Plenary
Frank Cichos (Universität Leipzig Germany)
Willem Kegel (Universiteit Utrecht, The Netherlands)
Yan Levin (UFRGS Porto Alegre Brazil)
Veronique Trappe (University of Fribourg, Switzerland)

DYNAMICS OF COMPLEX FLUIDS
Julia Yeomans (University of Oxford, UK), Plenary
Lydéric Bocquet (Université Lyon 1, France)
Roberto Di Leonardo (CNR-IPCF, Italy)
Gerald Fuller (Stanford University, USA)
Davide Marenduzzo (University of Edinburgh, UK)

MEMBRANES
Gerhard Gompper (Forschungszentrum Jülich GmbH, Germany), Plenary
Pietro Cicuta (University of Cambridge, UK)
Emma Sparr (Lund University, Sweden)

POLYMERS
Michael Rubinstein (The University of North Carolina at Chapel Hill, USA), Plenary
Joerg Baschnagel (Université de Strasbourg, France)
Jian Ping Gong (Hokkaido University, Japan)
Tim Lodge (University of Minnesota, USA)

SELF-ASSEMBLY
Daan Frenkel (University of Cambridge, UK), Plenary
Mirjam Leunissen (FOM Institute AMOLF, The Netherlands)
Andrew Turberfield (University of Oxford, UK)
José Maria Tavares (ISEL and CFTC, Lisboa, Portugal)

SURFACES AND INTERFACES
Jacob Klein (Weizmann Institute of Science, Israel), Plenary
Dirk Aarts (University of Oxford, UK)
Ashutosh Sharma (Indian Institute of Technology, Kanpur, India)
Kathleen J. Stebe (University of Pennsylvania, USA)

SOFT NANOTECHNOLOGY
Dan Luo (Cornell University, USA), Plenary
Paul Clegg (University of Edinburgh, UK)
Roland Netz (Technische Universität München, Germany)

More details can be found on the website:
http://www.ismc2013.it
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Please note the important (and strict) deadline for abstract submission: 30 April 2013.

Contact: Prof. Francesco Sciortino · E-mail: francesco.sciortino@phys.uniroma1.it

About SoftComp

SoftComp is a Network of Excellence – a tool developed under the 6th Framework Programme of the European Commission dealing with the integration of European research, with the intention of strengthening scientific and technological excellence. In particular, SoftComp aims to establish a knowledge base for an intelligent design of functional and nanoscale soft matter composites. It will do so by overcoming the present fragmentation of this important field for 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. This Network of Excellence has created an integrated team that is able to activate the European potential in soft matter composite materials and thus disseminate excellence through extensive training and knowledge transfer schemes.
Since December 2009, when EU funding came to an end, Softcomp has been a self-supporting consortium consisting of 38 research groups belonging to 34 different institutions.

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Network coordinator
www.eu-softcomp.net/about/part
e-Mail: **g.gompper@fz-juelich.de**

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Rings: Endless challenges for polymers without beginning or end

***Sebastian Goossen*[1] · *Ana Rita Brás*[1] · *Rossana Pasquino*[2] · *Wim Pyckhout-Hintzen*[1] · *Andreas Wischnewski*[1], *Dimitris Vlassopoulos*[2] · *Dieter Richter*[1]**

[1]) Jülich Centre for Neutron Science JCNS-1 and Institut for Complex Systems ICS-1, Forschungszentrum Jülich, D-52425 Jülich, Germany, [2]) FORTH, Institute of Electronic Structure and Laser, Heraklion, Crete 71110, Greece and University of Crete, Department of Materials Science and Technology, Heraklion 71003, Greece, E-mail: dvlasso@iesl.forth.gr

Figure 1

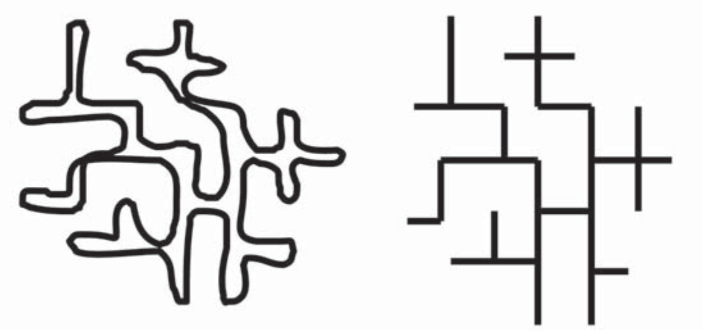

Fig. 1 - Illustration of ring polymer conformation as a lattice animal (left) and the equivalent sketch of a dendritically branched object without branch points, where a branch reflects a double fold (right).

Understanding the rheological properties of polymers is of central importance for the design, fabrication, processing and performance of a wide range of products, from consumer plastics to food packaging and pharmaceuticals. Unprecedented progress has been made in the last 40 years in this area , and is reflected, in part, in the physics Nobel prize awarded to Pierre Gilles de Gennes in 1991 [1].

Using the paradigm of linear flexible polymers, for simple, short unentangled linear polymer melts (with molar mass M smaller than the molar mass of an entanglement segment, Me), the stress relaxation modulus G(t) exhibits self-similar power-law-like dynamics with an exponential cut-off at the terminal time, as described by the Rouse model [2]. When M>Me, linear polymers become entangled their dynamics are severely hindered and described in the context of the tube model. Each chain relaxes its stress by diffusing curvilinearly along a hypothetical tube, representing the topological confinement generated by the entanglements [3]. Note that only the two free end-segments of every chain can randomize their direction. This is the mechanism of reptation, which when coupled to contour length fluctuations (the fluctuations of free chain ends) and constraint release (the local tube reorientation due to the motion of adjacent chains) [4] provides quantitative predictions of rheological experiments [5].

As a consequence, G(t) exhibits a plateau at intermediate times and exponential decay at longer times. Branched polymers are also described by the tube model, but they are very different. For example, stars, which are the simplest branched polymers, have arms with only one free end while the other end is fixed at the core. In that case, G(t) exhibits a logarithmically decaying plateau and its eventual relaxation takes place via arm retraction. The combination of reptation, retraction and constraint release in a hierarchical fashion from the outer segments inwards accurately describes the dynamics of any class of branched polymers as long as there are free ends [6]. SoftComp has played a key role in advancing the field to the current state of the art and especially in the quantification of the various mechanisms of molecular motion via the synergy of neutron scattering, rheology and modeling.

A grand challenge remains: What happens when polymers have no free ends at all? This is the case for ring (or cyclic) polymers. In fact, this is more than a polymer physics question. Rings are fundamental structures in biology. Mitochondrial and plasmic DNA are cyclic and often have a knotted structure; therefore ring polymers are ideal models for fundamental biophysical problems as well. For example, the organization of chromatin fibers in the cell nucleus can be understood by drawing analogies to the conformation and dynamics of densely packed rings. The chromatin fibers are packed in vivo at a rather high density, like a melt of linear chains.

However, the different chromosomes in the nucleus do not intermix but instead segregate in different distinct stable "territories", in analogy with the conformation in a melt of non-concatenated rings. This type of segregated

Figure 2

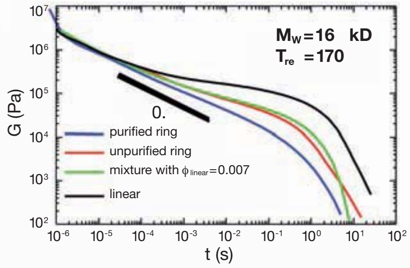

Fig. 2 - Stress relaxation moduli G(t) of entangled PS linear polymer, the respective ring polymer and ring/linear mixtures. The power-law stress relaxation of PS rings close to 0.4 instead of plateau is also shown. Taken from [10].

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Rings: Endless challenges for polymers without beginning or end (continued)

conformation appears typical of cells of higher eukaryotes, including humans. In addition, the fundamental understanding of ring structure and dynamics is particularly relevant for applications ranging from DNA separation to enzymology and from protein struc-ture stabilization to drug delivery. Therefore, exploring the dynamics of ring polymers is an important and timely research direction.

The history of unknotted ring polymer melts is long and fascinating. Concerning unentangled rings, it is still unclear whether the Rouse model applies. Further, it may be expected that the tube concept is not appli-cable to entangled rings. Instead, an entangled ring can be envisaged as trapped in an array of fixed obstacles; in such a case it exhibits a "lattice-animal"-like conformation comprising double-folded loops, which relax stress by sliding along the contour of other loops [7,8], in a way analogous to dendritically branched objects but without branching points (see Fig.1). Molecular simulations have confirmed the reduced size of cyclic polymers as compared to their linear counterparts of the same molar mass, due to their topology.

Moreover, recent findings have suggested an overall conformation of a crumpled globule and strong ring-ring interactions [9].

Figure 4

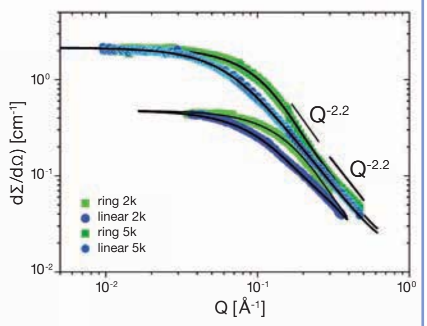

Fig. 4 - Comparison of the SANS data for the 2k and 5k ring poly(ethylene glycol)s and the respective linear analogues. The black lines represent fits to the data with the distinct form factors of cyclic and linear polymers respectively. The 2k data are taken from[11].

Hence, reliable experimental analysis of ring polymers is of utmost im-portance. Here we follow this route by addressing the missing link of structure and dynamics from the unentangled to the entangled regimes. We do so by combining synthesis, neutron scattering and rheology and by focusing on one model ring polymer, polyethylene glycol (PEG) with varying molar mass.

The cyclic PEGs investigated in these studies were made by a ring-closure reaction of linear PEG precursors under conditions of high dilution. Linear precursors were synthesized by anionic polymerization of ethylene oxide with an ethylene-glycol-based initiator. By this method, nearly monodisperse (all polymers have the same molecular weight), well-defined linear precursors were obtained. The linear precursors were modified to have two chemically different chain ends, which can combine to form a cyclic structure in an intramolecular condensation reaction.

Choosing PEG gives the advantage that with the modifications used here the newly established bond is chemically equivalent to all the other bonds in the polymer backbone and therefore a perfect cyclic polyether can be obtained. However, also intermolecular polycondensation of the linear precursors occurs. This leads to longer chains and as a result of these also to longer rings. Thus these by products of multiple molecular weight were removed by multiple fractionation. Furthermore, we introduced a second purification step to boost purity by separating linear impurities selectively from the ring polymers exploiting the chemical differences of existing and lacking chain ends. Additionally, for the rheological experiments which are very sensitive to minute amounts of linear impurities [10] (see Fig.2), the samples were fractionated at critical conditions in Pohang University, Korea.

Figure 5

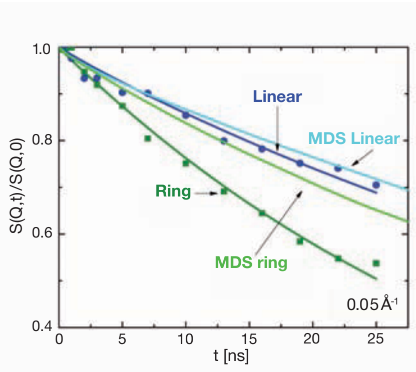

Fig. 5 - Comparison of the normalized dynamic structure factor (S(Q,t) vs t) for the 2k ring and linear blends at Q=0.05 Å⁻¹ from MDS with NSE. Taken from [11].

The conformation of rings in the melt was investigated by small angle neutron scattering (SANS). Experiments with both unentangled *(weight-average molar mass MW≈2kg/mol)* and slightly entangled rings *(MW≈5kg/mol)* confirm that they are more compact than their linear analogs, taking up only one-third of the volume occupied by the linear chains [11].

Fulfilling theoretical predictions for ring polymers, the radius of gyration of the cyclic structures is a factor of $\sqrt{2}$ smaller. This can be confirmed by the distinct *Q* dependence for linear and ring chains (see Fig. 4).

The dynamics of rings was studied by neutron spin echo (NSE), spectroscopy and linear shear rheology. The former is a highly sophisticated technique for studying polymer dynamics providing information over timescales up to several hundred nanoseconds, and SoftComp has unique expertise, in this field. The latter is nearly standardized butits implementation has to meet the challenge of measuring minute amounts of sample as purified rings come in quantities of a few milligrams. The small unentangled ring polymers were found to diffuse considerably faster than their linear analogs, and have a lower zero-shear viscosity, almost by a factor of 2, while having the same activation energy [11].

These results do not conform to the Rouse predictions. Cyclic and linear polymers consisting of the same number of monomer units are expected to diffuse identically because they are subject to the same total friction. We interpret this surprisingly fast center-of-mass diffusion of the cyclic PEG by invoking the much more compact conformation of the rings, which results in an effective shielding of the friction. The experimental data are nicely supported by molecular dynamics simulations (MDS) (see Fig.4).

Even by looking at the distance the polymer travels in time, the picture of a fast and compact ring and a more extended, slower linear chain is impressively corroborated. The expected transition to normal diffusion (linear in t) after traveling a distance equal to its own radius [12] is clearly found for the ring at the calculated 9 ns. In contrast, the linear chain is slower and – since it is larger than the ring – it has to travel a longer distance. Therefore, the transition to normal diffusion (38 ns) is outside the NSE time window and cannot be found in the data (see Fig.5).

Larger ring polymers also diffuse faster than their linear analogs but the comparison must involve the entanglement picture. The onset of entanglements in the linear case significantly slows down the diffusion, while the diffusion of the rings is in perfect agreement with the Rouse model predictions [13]. Also these results are qualitatively and quantitatively in good agreement with recent simulation work [14,15]. These results provide conclusive evidence of the different topology-induced macromolecular arrangement in the entangled state: whereas linear chains form transient networks (described by the tube model), rings do not due to their closed conformation (and the respective huge entropic cost). Instead, they are accommodated in the confined space among neighbors via local double folds of the lattice animal type (Fig.1).

The above results indicate that rings are full of surprises and challenges. Even in the unentangled regime, the absence of free ends has a dramatic effect on conformation and dynamics. The unique synergy among synthesis, purification, neutron scattering and rheology offers the muchneeded experimental toolbox for investigating the structure-dynamics interplay and can be combined with simulations and theory for exploring its origin.

Figure 6

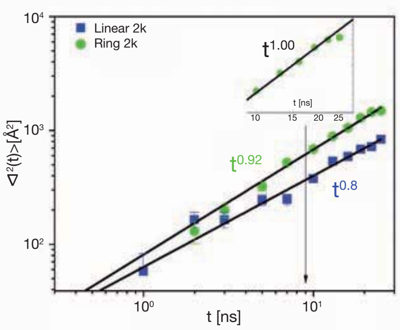

Fig. 6 - Mean-square displacements (<r2(t)>) extracted from Q=0.05 Å-1 NSE data for both the linear and ring 2k polymer. Taken from [11].

The obtained results will open new frontiers in polymer physics. Of prime interest are studies of higher molar masses, mixtures of rings with linear polymers, the effects of knottedness and rheo-SANS studies of nonlinear deformation.

The Softcomp team involves re-searchers from Forschungszentrum Jülich and FORTH, and collaborates with the groups of Professors M. Rubinstein (University of North Carolina at Chapel Hill, USA), T. Chang (Pohang University of Science & Technology, Pohang, Korea) and N. Hadjichristidis (University of Athens, Greece and KAUST, Thuwal, Kingdom of Saudi Arabia).

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SoftComp Annual Meeting Report 2012

The SoftComp Annual Meeting 2012 from 28th May to 1st June took place for the second time at Hotel Knossos Beach in Heraklion, Crete, Greece.

For the first time it was combined with the ESMI Annual Meeting. In fact, the Topical Workshop Soft Matter in Confinement was a joint session with the EU project and a full afternoon was devoted to the ESMI User meeting.

The joint effort contributed to improving the success of the event, and the total number of participants increased to 138 from 33 SoftComp groups.

The event consisted of three parallel sessions, with a total of 60 oral contributions, the Topical Workshop, with 8 talks, and the ESMI User Meeting, with 13 talks, also including 3 invited speakers.

Despite the very compact scientific programme, it was also possible to enjoy the relaxed atmosphere of the Meeting venue and to devote time to informal discussions, which were very popular with both students and scientists at the SoftComp Annual meeting, these discussions were the starting point for new collaborations and also for new EU projects.

A new partner (CIC-BiomaGUNE, Spain) was accepted by the Network Governing Board. The total number of SoftComp groups is now 38, due to the fact that three groups decided to terminate their participation in the SoftComp Consortium after the end of the commitment term, i.e. 30 November 2012. The fact that only three groups decided to terminate is a great success for the SoftComp Consortium and is also a sign of the quality of the activities performed within the SoftComp Consortium.

The SoftComp finances are in good shape and therefore the Network Governing Board decided to reduce the yearly fee to the SoftComp groups ensuring financial sustainability for the next 10 years.

F. Carsughi

Scientific highlights

The scientific achievments of SoftComp during 2012 are highlighted on the SoftComp website:
http://www.eu-softcomp.net/news/highlights

Coming Up...

SoftComp Conferences & Workshops

9 Jan. - 10 Feb. 2013
Molecular Biology of the Cell 2013 Laboratory and Lecture Course
Jointly organized by Institut Pasteur and Institut Curie, Paris, France
R. Bruzzone, P. Chavrier, C. Zurzolo
www.pasteur.fr/ip/easysite/pasteur/en/teaching/mechanisms-of-living-organisms/molecular-biology-of-the-cell

Jan. 2013
IRC Courses in Polymer Science and Technology
The University of Sheffield,UK
www.polymercentre.org.uk/training/

5-16 March 2013
43rd IFF Spring School 2012: Scattering Methods for Condensed Matter Research: Towards Novel Applications at Future Sources
Jülich, Germany · D. Richter
www.fz-juelich.de/portal/DE/Home/home_node.html

20-23 March 2013
Colloidal Dispersions in External Fields
Bonn, Germany · H. Loewen
www.codef.de/

24-29 March 2013
Macromolecules in Constrained Environments
Centre de Physique des Houches, France
www.houches2013.solvay-rhodia.com/

7-11 May 2013
NaNaX5. Nanoscience with Nanocrystals
Fuengirola, Spain · L. Liz-Marzan

28 May - 2 June 2013
Laboratory Course on Dielectric Spectroscopy
San Sebastian, Spain · A. Alegria

27 May - 31May 2013
SoftComp/ESMI Annual Meeting 2013
Rimini, Italy · F. Carsughi

7-14 June 2013
11th European Summer School on Scattering Methods Applied to Soft Condensed Matter
Bombannes, France · J. Oberdisse

19 - 25 June 2013
AMPERE NMR SCHOOL ZAKOPANE 2012
Poznan, Poland · S. Jurga
http://www.staff.amu.edu.pl/~school/

3-13 July 2013
The Enrico Fermi Summer School on "Physics of Complex Colloids"
Villa Monastero, Varenna, Italy
Organized by ITN-COMPLOIDS
F. Sciortno, C. Bechinger, P. Ziherl
http://www.itn-comploids.eu/

3-14 Sept. 2013
16th JCNS Laboratory Course Neutron Scattering
Jülich and Garching, Germany · R. Zorn
e-mail: reiner.zorn@gmail.com

11-13 Sept. 2013
Faraday Discussion 161: Lipids and Membrane Biophysics
London, United Kingdom · J. M. Seddon

Sept. 2013
Polymeric Materials
Halle (Saale), Germany · W. Paul

15-19 Sept. 2013
International Soft Matter Conference
Rome, Italy · F. Sciortino

24-26 Sept. 2013
German Neutron Scattering Conference
Gustav-Stresemann-Institut, Bonn, Germany
T. Brückel
http://www.fzjuelich.de/SharedDocs/Termine/

8-11 Oct. 2013
Trends and Perspectives in Neutron Scattering for Soft Matter and Biophysics
Tutzing, Munich, Germany
R. Bruchhaus, J. Colmenero, D. Richter
(DIPC, JCNS)
http://www.fz-juelich.de/SharedDocs/Termine/

12-15 Dec. 2013
Cell Shape Changes: Cell Motility and Morphogenesis
Paris, France · J. Plastino

13-16 Nov. 2014
Jülich Soft Matter Days
Bad Honnef, Germany
J. Dhont, G. Gompper, D. Richter

Personalia

Sofja Kovalevskaja Award Goes to Dr. Dmitry A. Fedosov

Dr. Dmitry A. Fedosov from Forschungszentrum Jülich (ICS-2) was presented with the Alexander von Humboldt Foundation's Sofja Kovalevskaja Award by Federal Research Minister Annette Schavan. This is one of the most highly endowed research awards in Germany. The 30-year-old mathematician will use the prize money of approximately € 1.3 million over a period of five years to set up his own research group to investigate the difference blood circulation in healthy tissue and tumours.

Prof. Luis Liz-Marzán

has been appointed Scientific Director of the Basque Centre for Cooperative Research in Biomaterials (CIC biomaGUNE), as of September 2012.
He will retain his role as member of SoftComp and biomaGUNE and will take over the rights and obligationsas a SoftComp member at the University of Vigo starting member from December 2012.

For more frequently updated information, please see also the SoftComp web pages...
Vacancies: **www.eu-softcomp.net/news/jobs** · SoftComp News: **www.eu-softcomp.net/news/**
SoftComp Events: **www.eu-softcomp.net/news/cal**

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Editorial Details

Editors:
Friedrich Hugo Bohn, Gerhard Gompper
SoftComp Consortium · Forschungszentrum Jülich GmbH · 52425 Jülich · Germany

Contact:
Tel.: +49 2462 90 - 5073
Fax: +49 2462 90 - 5299
f.h.bohn@fz-juelich.de
www.eu-softcomp.net

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SOFT MATTER COMPOSITES