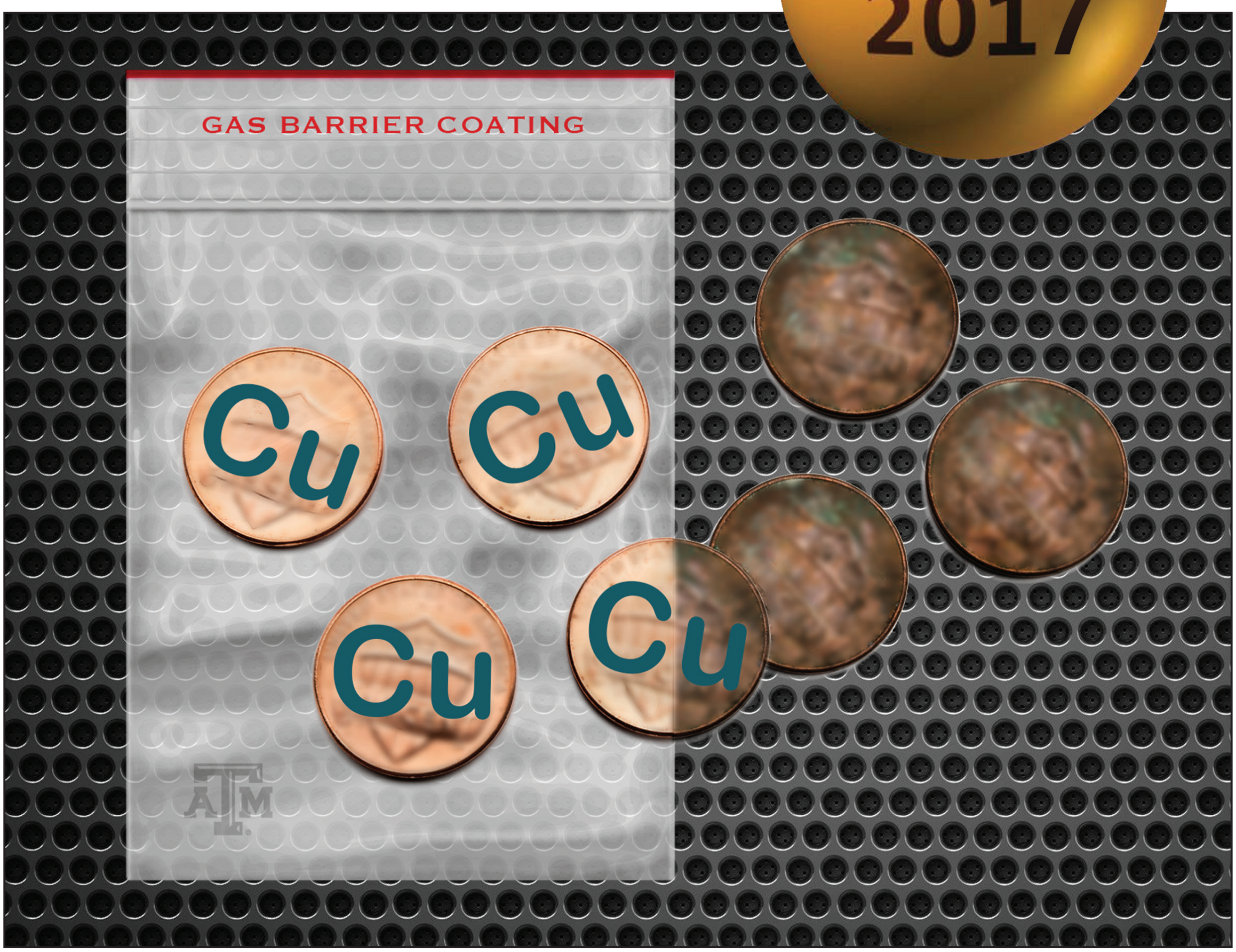
Best of Macromolecular Journals

Edition 2017



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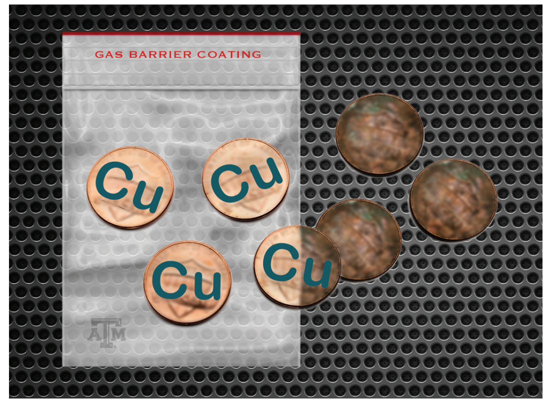
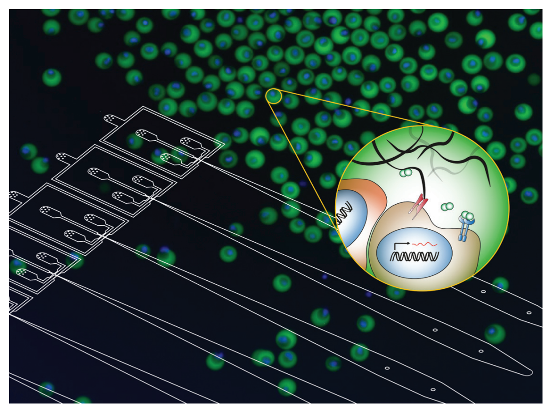
Best of Macros Edition 2017

Front Cover: Polyelectrolyte coacervates can be deposited as transparent, high gas barrier coatings in a single processing step. Depositing a 2 μm thick barrier film, by rod coating an aqueous polyelectrolyte complex onto a 175 μm thick polyethylene terephthalate film, improves the oxygen transmission rate by a factor of 120. The cover image depicts the ability to protect copper coins from oxidative degradation using this technology, but food, pharmaceutical and electronics packaging could all be aided by this coating. This research is reported by Merid Haile, Owais Sarwar, Robert Henderson, Ryan Smith, and Jaime C. Grunlan. (DOI: 10.1002/marc.201600594)



Back Cover: Droplet-based microfluidics is a powerful and versatile technique to prepare cell-laden hydrogel particles in the micrometer range, so called microgels (shown as green spheres laden with cells which are labeled in blue). Microgels allow for highly specific creation of a myriad of discrete and miniaturized mimics of the three-dimensional natural extracellular matrix that is composed of biomolecules, cell adhesion and degradation sites, as well as neighboring cells (represented by the inset). Lithography techniques allow for the design and fabrication of highly complex flow channels (silhouette shown) for upstream adjustment of the fluid streams and downstream manipulation of the droplets. This research is reported by Torsten Rossow, Philipp S. Lienemann, and David J. Mooney. (DOI: 10.1002/macp.201600380)



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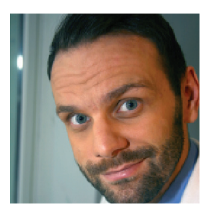

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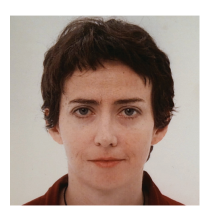

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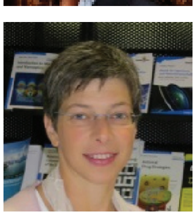

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Best of Macromolecular Journals – Edition 2017

Dear Readers,

Since 2008, the most noteworthy contributions published during the past year in the Macromolecular Journals have been compiled into an exclusive reprint issue called the *Best of Macromolecular Journals*. A New Year calls for new beginnings, and so we are very excited to present to you the *Best of Macromolecular Journals – Edition 2017*, in its entirely new format.

This year, the 12 best articles selected from the Macromolecular Journals are highlighted, with a special focus on the authors of these manuscripts. Here, you can read about our distinguished authors and find the answers to some questions you may yourselves have wanted to ask – what does he/she like to do outside of the lab? What inspires his/her research? Answers to these questions and more, biographies of the corresponding authors, and short summaries of the selected articles are all included this special edition. The full interviews with the authors are available on our recently launched news website, *Advanced Science News*.

The articles featured in this special edition cover a broad variety of topics, from classical polymer synthesis and drug delivery, to materials-oriented research, and illustrate the international distribution of our authors and readership.

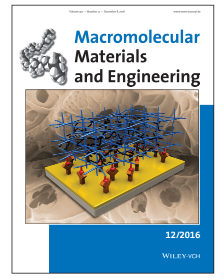
As in previous years, this edition will be distributed throughout the year at major conferences in the fields of materials and polymer science. The *Best of Macromolecular Journals – Edition 2017*, is available online at www.best-of-macros.de. Here you'll find free online access to all featured articles, the interviews with the authors, and more.

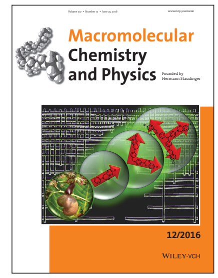
We hope that you will enjoy discovering more about the research and the authors in this special edition, and we wish to warmly thank all the contributors who took the time to share their stories with our readers.

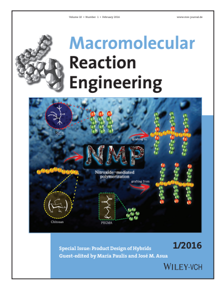
Anke Osterland and Emma Robertson

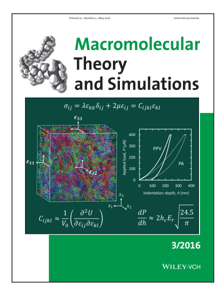
Associate Editors
Macromolecular Journals

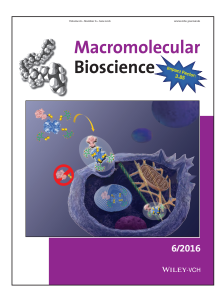
PS: For more information on *Best of Macromolecular Journals*, please visit www.best-of-macros.de.









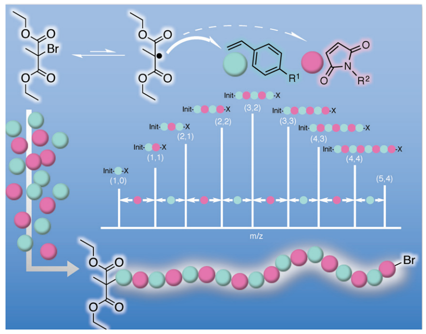


Macromolecular Rapid Communications

Sequence Analysis for Alternating Copolymers by MALDI-TOF-MS: Importance of Initiator Selectivity for Comonomer Pair

K. Nishimori, M. Ouchi,* M. Sawamoto*

Macromol. Rapid Commun. 2016, *37*, 1414–1420
DOI: 10.1002/marc.201600251



A malonate-based alkyl halide initiator (DEMM–Br) for metal-catalyzed living radical polymerization allows sequence analysis by MALDI-TOF-MS for an alternating copolymer of styrene and maleimide derivatives. The electron density of the radical species from DEMM–Br is poor enough to induce selective initiation to styrenebased monomer, and thus the unit next to the initiator moiety can be defined to give simpler peak patterns in MALDI-TOF-MS spectra.

About the Authors

Mitsuo Sawamoto received his B.S. (1974), M.S. (1976), and Ph.D. degrees (1979) in polymer chemistry from Kyoto University. After postdoctoral research at the Institute of Polymer Science, the University of Akron, (1980–81), he joined the faculty of the Department of Polymer Chemistry, Kyoto University in 1981 as Assistant Professor and since 1994 he has been Professor of Department of Polymer Chemistry, Graduate School of Engineering, Kyoto University. He has served as an executive member of the Science Council of Japan, a titular member of IUPAC Polymer Division, and President of the Society of Polymer Science, Japan (SPSJ).

Makoto Ouchi has been an associate professor in the Department of Polymer Chemistry, Graduate School of Engineering, Kyoto University since 2004. He received his Ph.D. degree at Kyoto University in 2001 under the supervision of Professor Sawamoto. He then joined Toyota Central R&D Labs to develop poly(lactic acid)-based automobile resin, and was later a visiting researcher in Prof. David A Tirrell's group at the California Institute of Technology. He was promoted to an associate professor in 2010, and since 2013, he is a researcher at PRESTO (molecular technology and new function), Japan Science and Technology Agency (JST). His current interests include development of precision polymerizations, as well as development of very active polymerization catalysts.

Ask the Authors

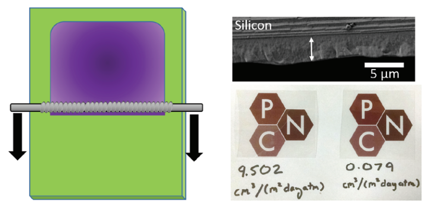
- **What is the biggest advantage in publishing with Wiley-VCH?** *M.S.: The advantage is that the article may be chosen for the Best of Macromolecular Journals! This is really appreciated and good encouragement for us.*
- **What other topics are you working on at the moment?** *M.O.: We have recently found a ring-expansion cationic polymerization of vinyl monomer with a cyclic initiator. I believe the polymerization would open the door to construction of well-defined ring-based macromolecular architectures and creation of ring-oriented functions.*
- **What are the main challenges in the broad area of your research?** *M.O.: There is a big difference between natural polymers and synthetic polymers in terms of structure and function, though both are the same macromolecules. In particular, sequence is an essential structure for natural polymers to determine their functions. Sequence control for synthetic polymer is a challenging subject but I believe it could change the concept of macromolecular engineering for functional materials. One ultimate challenge in my research is synthesis of a sequence-controlled polymer consisting of the same monomer derivatives (e.g., methacrylates, acrylamides, styrenes).*
- **I am waiting for the day when....** *M.O.: my research becomes really useful for human life.*
- **My favorite molecule(s) is/are.....** *M.O.: isobutyl vinyl ether, because this is the monomer I first polymerized.*

For more information on the *Best of Macromolecular Journals*, and to read the full interview, please visit www.best-of-macros.de.

Polyelectrolyte Coacervates Deposited as High Gas Barrier Thin Films

M. Haile, O. Sarwar, R. Henderson, R. Smith, J. C. Grunlan*

Macromol. Rapid Commun. 2017, *38*, 1600594
DOI: 10.1002/marc.201600594



Polyelectrolyte coacervates are deposited as transparent, high gas barrier coatings, using aqueous suspensions under ambient conditions. By exploiting the salt-dependent viscosity and stability of these complexes, electrostatically associated polyethylenimine and poly(acrylic acid) could be rod-coated and subsequently treated to improve the oxygen transmission rate of polyethylene terephthalate by a factor of 120.

About the Author

Jaime Grunlan has distinguished himself internationally in education, research and service. His research focuses on thermal and transport properties of polymer nanocomposites, especially in the areas of thermoelectric energy generation, gas barriers, and fire prevention. He has published over 130 journal papers and filed several patents. Additionally, Jaime has graduated 19 Ph.D. students and mentored more than 50 undergraduate students in his laboratory. He sits on the International Advisory Boards of *Macromolecular Rapid Communications* and *Macromolecular Materials and Engineering*.

Ask the Author

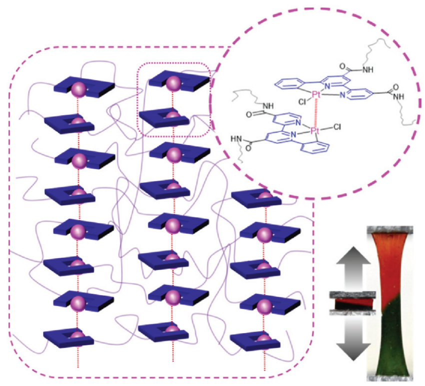
- **What is the biggest advantage in publishing with Wiley-VCH?** *J.C.G.: High visibility and impact of the work. The editorial staff is very responsive and helpful. The whole review and production process is very efficient.*
- **What fields did you study?** *J.C.G.: Polymer science, polymer nanocomposites, flame retardant treatments, thermoelectric energy generation (i.e. waste heat recycling), gas barriers, and separation.*
- **Why did your choose the area of macromolecular science?** *J.C.G.: My work is very applied and these topics have tremendous opportunity to impact "real life" products (e.g., environmentally benign flame retardant sleepwear for children, high-performance food packaging to extend shelf-life, clothing that produces electricity from the wearers own body heat, etc.).*
- **Could you give some advice for researchers starting out in your field?** *J.C.G.: Take scientific risks and be sure to travel. You need to sell your work to keep it supported. When people don't see you, it is difficult to have an impact. Even when someone reads a journal paper, they become much more excited when they see the work presented in-person.*
- **How would you describe to the layperson the most significant result of this study?** *J.C.G.: Current plastic packaging used for food, pharmaceuticals, and electronics is not sufficient to provide long shelf life. We have created a cost-effective coating that turns conventional plastic packaging film into something that can extend shelf life 10–100 times.*
- **What I look for first in a publication is...** *J.C.G.: an interesting title.*
- **If I were not a scientist, I would be...** *J.C.G.: a pastor or missionary.*

For more information on the *Best of Macromolecular Journals*, and to read the full interview, please visit www.best-of-macros.de.

A Highly Stretchable and Autonomous Self-Healing Polymer Based on Combination of Pt···Pt and π–π Interactions

J.-F. Mei, X.-Y. Jia, J.-C. Lai, Y. Sun, C.-H. Li,*
J.-H. Wu, Y. Cao, X.-Z. You,* Z. Bao*

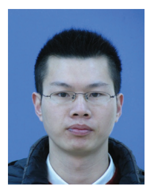
Macromol. Rapid Commun. 2016, *37*, 1667–1675
DOI: 10.1002/marc.201600428



A highly stretchable and autonomous self-healing film is obtained by the combination of Pt···Pt and π–π interactions into PDMS polymer. Owning to the mediate strength, the as prepared polymer can be stretched to over 20 times of its original length. When damaged, the polymer is able to completely heal at room temperature within 12 h without any external stimuli.

About the Authors

Zhenan Bao is a Professor of Chemical Engineering and by courtesy Professor of Chemistry and Professor of Material Science and Engineering at Stanford University. Prior to joining Stanford in 2004, she was a distinguished member of the technical staff in Bell Labs, Lucent Technologies, from 1995 to 2004. She pioneered a number of design concepts for organic electronic materials. Her work has enabled flexible electronic circuits and displays. In her recent work, she has developed skin-inspired organic electronic materials, which have resulted in unprecedented performance or functions in medical devices, energy storage, and environmental applications.



Cheng-Hui Li is an Associate Professor at Nanjing University, P. R. China. He received his B.S. degree in environmental engineering from Nanchang University (P. R. China) in 2002, and Ph.D. degree in inorganic chemistry from Nanjing University (P. R. China) in 2007. From 2005 to 2006 and in 2008, he worked as a research assistant with Prof. Chi-Ming Che at The University of Hong Kong. From 2013 to 2014, he worked as a visiting scholar with Prof. Zhenan Bao at Stanford University. His current research focus is on functional materials based on dynamic coordination bonds.

Ask the Authors

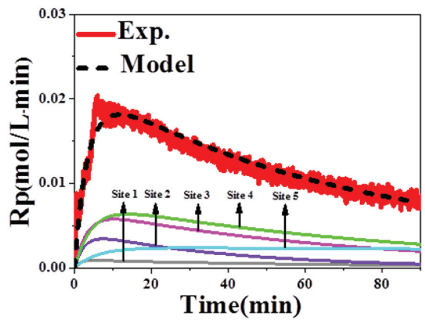
- **How was your experience in publishing with Wiley-VCH (or the specific journal)?** *C.-H.L.: I have published two papers in Macromolecular Rapid Communications (MRC) this year. The peer review process is rapid and professional while the editorial decisions are fair and impartial. MRC would be my preferred choice for the publication of my future studies.*
- **What fields did you study?** *C.-H.L.: My research field is coordination chemistry. I'm now trying to incorporate dynamic coordination bonds into the polymer matrix to develop novel functional materials like self-healing materials and shape memory materials.*
- **What is the most significant result of this study?** *C.-H.L.: This study represents the first example where attractive metallophilic interactions are utilized to design self-healing materials.*
- **What new scientific problems does this work raise?** *C.-H.L.: A new scientific problem that we are now working on is: how to characterize and control the dynamic crosslinking interactions in a polymer matrix.*
- **How did the collaboration on this project start?** *C.-H.L.: This project was initiated when I worked in Prof. Zhenan Bao's group at Stanford University as a visiting scholar. We conceived the idea of utilizing the molecular interactions between cyclometalated platinum(II) complexes to derive highly stretchable and autonomous self-healing materials.*
- **I am waiting for the day when...** *C.-H.L.: the secrets of life are discovered.*
- **My favorite molecules are...** *C.-H.L.: porphyrin and phthalocyanine.*

For more information on the *Best of Macromolecular Journals*, and to read the full interview, please visit www.best-of-macros.de.

Estimation of Apparent Kinetic Constants of Individual Site Types for the Polymerization of Ethylene and α-Olefins with Ziegler–Natta Catalysts

K. Chen, S. Mehdiabadi, B. Liu, J. B. P. Soares*

Macromol. React. Eng. 2016, *10*, 551–566
DOI: 10.1002/mren.201600003



How to determine the apparent olefin polymerization kinetics constants of multisite catalysts, such as heterogeneous Ziegler-Natta catalysts is shown. This novel method fits simultaneously the molecular weight distribution, instantaneous ethylene uptake profile and cumulative polymer yield in a semi-batch reactor to determine the activation, deactivation, and pseudopropagation constants per site type in these catalysts.

About the Author

João B. P. Soares is a Professor in the Department of Chemical and Materials Engineering at the University of Alberta (Edmonton, AB, Canada). He holds a Campus Alberta Innovates Program (CAIP) Chair in Interfacial Polymer Engineering for Oil Sands Processing, and a Canada Research Chair (Tier I) in Advanced Polymer Reaction Engineering. In his assignment as CAIP Chair, Prof. Soares is trying to solve one of the most pressing environmental problems associated with oil sand processing: the elimination of tailing ponds with novel polymer flocculants. Under his Canada Research Chair, he concentrates on advancing the technology for polyolefin production and characterization. Before joining the University of Alberta ion July 2013, João Soares was a Professor in the Department of Chemical Engineering at the University of Waterloo (Waterloo, ON, Canada) for 18 years. He worked as a research and development engineer for Pronor, COPENE, and Polibrasil (Brazil) before joining the University of Waterloo. Professor Soares is a member of the Executive Advisory Board of Wiley–VCH *Macromolecular* journals and responsible for the coordination of *Macromolecular Reaction Engineering.*

Ask the Author

- **How was your experience in publishing with Wiley-VCH?** *J.B.P.S.: I have been publishing papers with Wiley–VCH since the very beginning of my career. Two of my earliest papers, resulting from my Ph.D. thesis, were published in Macromolecular Theory and Simulation in 1996, and since then I do not believe a single year has passed without me publishing one or more papers in the Wiley-VCH Macromolecular journals.*

- **What other topics are you working on at the moment?** *J.B.P.S.: After more than 10 years working on polyolefin reaction engineering and characterization, I have recently started also working on water-soluble polymer flocculants specifically designed for the remediation of tailing ponds resulting from oil sands extraction. The oil sands industry is a vital sector of the Canadian economy, and I am thrilled to be part of this activity.*

- **What is your favorite activity outside of the lab?** *J.B.P.S.: I am an avid reader in several topics not related to polymers, but in addition to that, one of my passions is landscape photography.*

- **What are the main challenges in the broad area of your research?** *J.B.P.S.: Despite the wide use of polyolefins in modern society, we still do not know how to quantify the fundamental behavior of traditional olefin polymerization catalysts, such as Ziegler–Natta and Phillips catalysts. We hope the approach we propose in this article is one step towards a better quantitative description of these catalyst systems.*

- **The best advice I have ever been given is...** *J.B.P.S.: "Joe, good thing you are becoming a professor because you are clearly not able to do anything else!", given by my Ph.D. thesis supervisor, Professor Archie Hamielec, as I struggled to put together a conference poster presentation.*

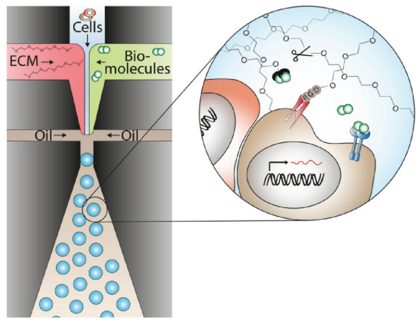
For more information on the *Best of Macromolecular Journals*, and to read the full interview, please visit www.best-of-macros.de.

Macromolecular Chemistry and Physics

Cell Microencapsulation by Droplet Microfluidic Templating

T. Rossow, P. S. Lienemann, D. J. Mooney*

Macromol. Chem. Phys. **2017**, *218*, 1600380
DOI: 10.1002/macp.201600380



Hydrogel particles in the micrometer range, so called microgels, are excellent candidates to create, in a high throughput manner, a myriad of mimics of the three dimensional natural extracellular matrix. As a result, microgels have gained importance for the encapsulation of living cells by droplet microfluidics. This trend article highlights and critically reviews current approaches, reveals technical challenges, and shows perspectives for future developments.

About the Author

David Mooney is the Pinkas Family Professor of Bioengineering at Harvard University, and a Core Faculty Member of the Wyss Institute. His laboratory designs biomaterials to make cell and protein therapies effective and practical approaches to treat disease. He is a member of the National Academy of Engineering, and the National Academy of Medicine. He has won numerous awards, including the Clemson Award from the SFB, MERIT award from the NIH, and several teaching awards. His inventions have been licensed by twelve companies, leading to commercialized products, and he is active on industrial scientific advisory boards.

Ask the Author

- **What is your scientific background?** *D.J.M.: I was trained as a chemical engineer.*
- **Why did your choose the area of macromolecular science?** *D.J.M.: The role of the macromolecules within tissues of the body, in terms of how they regulate cell biology, fascinated me as a Ph.D. student.*
- **Could you give some advice for researchers starting out in your field?** *D.J.M.: Develop expertise in both the relevant biology and materials science.*
- **What future opportunities do you see (in the light of the results presented in this paper)?** *D.J.M.: Cell encapsulation by droplet-based microfluidics offers novel and versatile approaches for addressing biomedical challenges. Cell-laden microgels may be used for single cell drug testing in 3D, for mimicry of stem cell niches by controlled assembly of individual microgels, and for stem cell therapy by minimally invasive microgel delivery through needles.*
- **What are the main challenges in the broad area of your research?** *D.J.M.: Despite great strides that have been made over the last decade by combining droplet-based microfluidics with advanced biomaterials for 3D cell culture, we believe that there are still technical challenges that currently limit advances in the technology and its suitability for broad use. In our opinion, challenges that need to be overcome are the Poisson distribution of microencapsulated cells, cell egress out of the microgels, and the isolation and monitoring of individual microgels in long-term culture experiments.*
- **The best advice I have ever been given is...** *D.J.M.: to pursue what gets you excited.*
- **My favorite molecule is...** *D.J.M.: alginate.*

For more information on the *Best of Macromolecular Journals*, and to read the full interview, please visit www.best-of-macros.de.

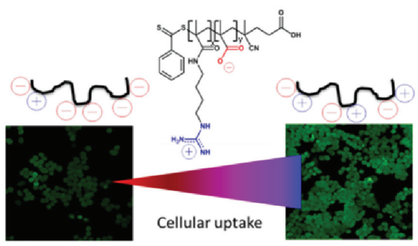
Best of Macros Edition 2017

Macromolecular Chemistry and Physics

Direct Correlation Between Zeta Potential and Cellular Uptake of Poly(methacrylic acid) Post-Modified with Guanidinium Functionalities

Y. Y. Khine, M. Callari, H. Lu, M. H. Stenzel*

Macromol. Chem. Phys. **2016**, *217*, 2302–2309
DOI: 10.1002/macp.201600161



Conjugation of agmatine to poly(methacrylic acid) can enhance the cellular uptake of the polymer by cancer cells. It is observed that only small amounts of guanidinium are required to achieve a visibly increased cellular uptake. These nontoxic polymers with zwitterionic structure can be useful for polymer–drug conjugates to assist the efficient delivery of drugs into cells.

About the Author

Martina Stenzel studied chemistry at the University of Bayreuth, Germany, before completing her Ph.D. in 1999 at the Institute of Applied Macromolecular Chemistry, University of Stuttgart, Germany. She started as a postdoctoral fellow at UNSW in 1999 and is now a full Professor in the school of chemistry as well as co-director of the Centre for Advanced Macromolecular Design (CAMD). She has published more than 260 peer-reviewed papers mainly on polymers for nanoparticle design. Her research interest is focused on the synthesis of functional nanoparticles for drug delivery applications. She received a range of awards including the 2011 Le Fèvre Memorial Prize of the Australian Academy of Science.

Ask the Author

- **Why did your choose the area of macromolecular science?** *M.H.S.: I was always fascinated by the possibilities polymers offer: They come in all shapes, sizes and properties. No other material has such flexibility.*
- **What was one of the biggest challenges in your career?** *M.H.S.: Accepting, that you do less research the more you climb up the university ladder. I am missing the days when I just sat down and tried to analyze my NMRs.*
- **What is the most significant result of this study?** *M.H.S.: Add a few positive charge guanidinium functionalities to your negative charge polymer and you can enhance the cellular uptake immediately!*
- **Did you expect a different outcome? If so, what was your initial prediction?** *M.H.S.: We did think that we require a critical amount of cationic charges on the polymer to achieve a good cellular uptake. It was interesting to see that there was no threshold and the uptake increased with increasing amount of guanidinium functionalities.*
- **Did serendipity play a part in this work?** *M.H.S.: Not this time! Every step in the synthesis was hard work as many conditions only led to low conversions. I have to praise here YeeYee, the student who did the work, for not giving up.*
- **What is your next project?** *M.H.S.: 3D printing! This is more something I will be doing on the side, but it is a lot of fun seeing structures grow. We are developing some new interesting polymer formulations to enhance the mechanical stability.*
- **If I were not a scientist, I would be....***M.H.S.: an astronaut.*
- **I would like to have discovered.....***M.H.S.: DNA: four building blocks, endless possibilities.*

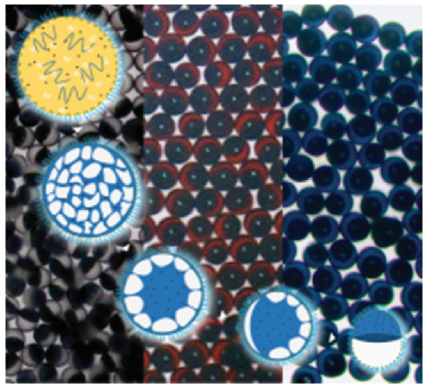
For more information on the *Best of Macromolecular Journals*, and to read the full interview, please visit www.best-of-macros.de.

Macromolecular Chemistry and Physics

Bicolored Janus Microparticles Created by Phase Separation in Emulsion Drops

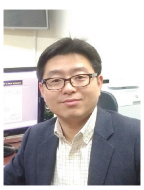
N. G. Min, T. M. Choi, S.-H. Kim*

Macromol. Chem. Phys. **2017**, *218*, 1600265
DOI: 10.1002/macp.201600265



Janus microparticles are prepared by phase separation of two immiscible polymers confined in emulsion drops. Spontaneous staining of selected compartment by dyes renders the microparticles bicolored. Magnetic nanoparticles embedded in the polymer matrix provide a net magnetic moment on the microparticles. Janus microparticles with optical and magnetic anisotropy can be potentially used as active color pigments for reflection-mode displays.

About the Author



Shin-Hyun Kim is an EWon associate professor of chemical and biomolecular engineering, KAIST. He received his B.S. degree in chemical engineering from Yonsei University, Korea, in 2004 and a Ph.D. degree in chemical and biomolecular engineering from KAIST, Korea, in 2009 under the supervision of the late Prof. Seung-Man Yang. Following this, he worked as a postdoctoral researcher in Weitz's group at Harvard University, USA. His major research interests include droplet-based microfluidics, colloidal photonic structures, and capillarity phenomena.

Ask the Author

- **What is your scientific background?** *S.-H.K.: Chemical engineering.*
- **What fields did you study?** *S.-H.K.: Colloidal science.*
- **What is the most significant result of this study?** *S.-H.K.: We create two distinct, equally exposed compartments in spherical particles through phase separation of polymers dissolved in single-emulsion drops.*
- **Did serendipity play a part in this work?** *S.-H.K.: We have studied phase separation of polymers in emulsion drops. However, most material sets yield either non-spherical shapes with equal exposure of two faces, or spherical shapes with unequal exposure; both are not appropriate for active color pigments. Accidently, we tried one set of materials and found that the set yields spherical shapes with equal exposure. Based on the experiment, we further expanded our work to develop active color pigments.*
- **What prompted you to investigate this topic?** *S.-H.K.: Our group has worked in the development of active color pigments for e-ink displays. To produce pigment particles with multi-compartments, we have used complicated microfluidics. However, the throughput of production was too low to use the pigments in practical devices. While we looked for a scalable technique, we found that polymer–polymer phase separation in emulsion drops can yield two distinct compartments in single particles. As the phase separation does not require precompartmentalized drops, we believed that the production of Janus particles using phase separation can be scaled up and started this project.*
- **My favorite piece of research is...** *S.-H.K.: the development of pigment-free multicolor patterns using a creep behavior of polymeric inverse opals (Lee et al. Adv. Funct. Mater.* ***2016****, 26, 4587).*
- **My biggest motivation is...** *S.-H.K.: to educate my students. I love all students in my group and hope they get a job they want. Through research, students learn what they need for their future careers.*

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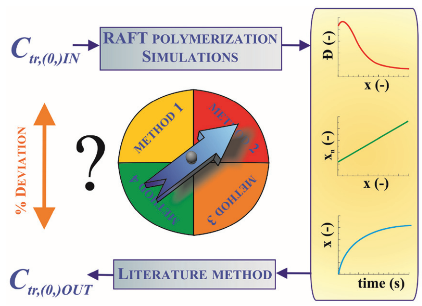
Best of Macros Edition 2017

Macromolecular Theory and Simulations

Chain Transfer in Degenerative RAFT Polymerization Revisited: A Comparative Study of Literature Methods

P. Derboven, P. H. M. Van Steenberge, M.-F. Reyniers , C. Barner-Kowollik,* D. R. D'hooge,* G. B. Marin

Macromol. Theory Simul. 2016, *25*, 104–115
DOI: 10.1002/mats.201500076



Under the validity of the degenerative transfer mechanism, the activation/deactivation process in reversible addition fragmentation chain transfer (RAFT) polymerization can be formally quantified by transfer coefficients. In the present work, the different literature methods to experimentally determine these RAFT transfer coefficients are reviewed and theoretically reevaluated. General guidelines on when which method should be applied are formulated.

About the Authors

Christopher Barner-Kowollik received his Ph.D. 1999 (Göttingen University). After postdoctoral research with Prof. Tom Davis and academic positions at the University of New South Wales in Sydney, he was appointed Full Professor in 2006 at the same institution and Chair of Macromolecular Chemistry at the Karlsruhe Institute of Technology (KIT) in 2008. He is currently Professor of Materials Science at the Queensland University of Technology (QUT) and leads a macromolecuar chemistry research group at the KIT. His research interests include macromolecular precision design in solution and on surfaces via rapid light-induced methodologies, the design of hybrid and adaptive polymer materials at the interface of polymer chemistry and materials science, as well as in-depth studies into the mechanisms and of polymerization processes.

Dagmar R. D'hooge is an associate professor in Polymer Reaction Engineering and Industrial Processing of Polymers at Ghent University. He is a member of the LCT and associated member of the Department of Textiles. In 2006, he received his chemical engineering degree from Ghent University where he then obtained his Ph.D. in 2010. From October 2012 onwards, he was a postdoctoral researcher of the Fund for Scientific Research Flanders. He was a visiting researcher in the Matyjaszewski Polymer Group (CMU) in 2011 and the Macromolecular Architectures Research Team (KIT) in 2013. His research focuses on model-based design of (post)polymerization and polymer processing.

Ask the Authors

- **What is the biggest advantage in publishing with Wiley-VCH?** *C.B.-K.: High quality journals, great editorial staff, and a very fair process of editing the contributions.*

- **Could you give some advice for researchers starting out in your field?** *C.B.-K: Have passion for what you do, share your experiences, and excite students and colleagues. On you own you might be faster, but in collaboration with others you will get further.*

- **How did the collaboration on this project start?** *C.B.-K: We already collaborate for several years, as we enjoy working together and two areas of expertise are perfectly fitting: Mine in physical chemistry and macromolecular synthesis and advanced kinetic modelling as well as reaction engineering in the team of Prof. D'hooge.*

- *D.R.D.: The collaboration of my team with that of Prof. Barner-Kowollik has already started years ago and has contributed to a better understanding of the impact of the synthesis conditions on the final polymer product properties utilizing advanced experimental and simulation techniques.*

- **The best advice I have ever been given is...** *D.R.D.: There is a solution for every challenge.*

- **My biggest motivation is...** *C.B.-K.: when I can see the spark in the eyes of my students and post-docs having caught fire for a particular research question.*

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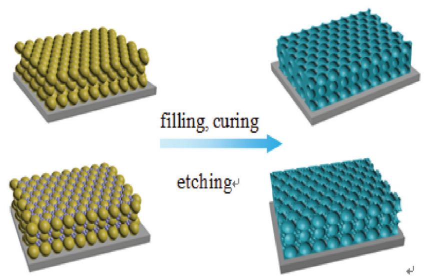
Macromolecular Materials and Engineering

Fabrication of Robust Hydrophobic and Super-Hydrophobic Polymer Films with Onefold or Dual Inverse Opal Structures

Y. Wu, S. Zhou, L. Wu*

Macromol. Mater. Eng. **2016**, *301*, 1430–1436
DOI: 10.1002/mame.201600322



Robust hydrophobic and super-hydrophobic polymer films are fabricated by backfilling the silica colloidal crystal templates with the mixture of fluoropolymer, thermoset hydroxyl acrylate resins, and curing agent. The films exhibit excellent long-term hydrophobicity or super-hydrophobicity against high and low temperatures, strong acid, and alkali.

About the Author

Limin Wu received his Ph.D. degree from Zhejiang University in 1991. From 1991 to 1994, he worked as a lecturer and then as an associate professor in Zhongshan University. Thereafter, from 1994 to 1999, he worked as a visiting professor at Pennsylvania State University and Eastern Michigan University. He joined Fudan University in 1999, where he is currently a “Changjiang Scholar” Professor awarded by the Ministry of Education of China. His current research interests include synthesis, assembly, and photoelectric properties of organic-inorganic hybrid nanoparticles, hollow inorganic particles, and the development of functional coatings.

Ask the Author

- **What is your next project?** *L.W.: To build smart materials for optoelectric materials and nanodevices.*
- **What is your favorite activity outside of the lab?** *L.W.: My favorite activity outside of the lab is a round-the-world tour.*
- **What is the most significant result of this study?** *L.W.: We have demonstrated a facile method for fabrication of robust hydrophobic and super-hydrophobic polymer films based on the colloidal inverse opal structures prepared from unitary or binary silica colloidal crystal templates. Unlike the previously reported super-hydrophobic films prepared by post-modification with low-surface-energy substances, which easily lose their wettability once their surface composition or structure are damaged, the obtained inverse opal polymers have almost identical chemical composition and microstructure between their surfaces and bulks. Therefore, these polymer films can possess excellent long-term hydrophobicity or super-hydrophobicity and heat-freeze stability as well as acid- and alkali- resistant property.*
- **What was the biggest surprise on the way to the results presented in this paper?** *L.W.: Dual ordered porous structure can obviously enhance the hydrophobicity of polymer films compared to the unitary one.*
- **What research topic do you think is likely to become one of the “hot topics” in macromolecular science in the near future?** *L.W.: How to fabricate durable and massive surface materials is likely to become one of the “hot topics” in macromolecular science in the near future.*
- **What are the main benefits of your research now or in future?** *L.W.: Functional coatings for cars, ships, metals, etc.*
- **If I were not a scientist, I would be a....** *L.W.: judge.*

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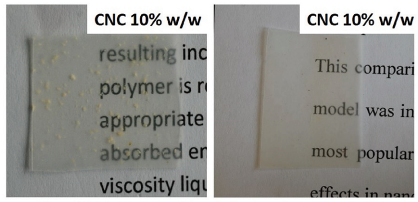
Fabrication and Properties of Polyethylene/Cellulose Nanocrystal Composites

J. Sapkota, J. C. Natterodt, A. Shirole,
E. J. Foster, C. Weder*

Macromol. Mater. Eng. **2017**, *302*, 1600300
DOI: 10.1002/mame.201600300



Directly Melt-Mixed ***Premixed and Melt-Mixed***

Homogeneous nanocomposites of low density polyethylene (LDPE) and cellulose nanocrystals (CNCs) can be produced by mixing aqueous LDPE slurry with aqueous CNC suspension and compounding such mixtures under low-shear conditions. They show an increase in stiffness and strength vis-à-vis the neat polymer.

About the Author

Christoph Weder is the Director of the Adolphe Merkle Institute (AMI) at the University of Fribourg, Switzerland and leads the Swiss National Center of Competence in Research, Bio-Inspired Materials. Chris was educated at ETH Zurich and held positions at the Massachusetts Institute of Technology, ETH Zurich, and Case Western Reserve University, before joining the AMI as Professor for Polymer Chemistry and Materials in 2009. His group investigates stimuli-responsive polymers, supramolecular materials, bio-inspired materials, and polymer nanocomposites. Chris has trained about 70 Ph.D. students and postdocs, co-authored about 230 research papers and book chapters, and he is co-inventor of nearly twenty patents.

Ask the Author

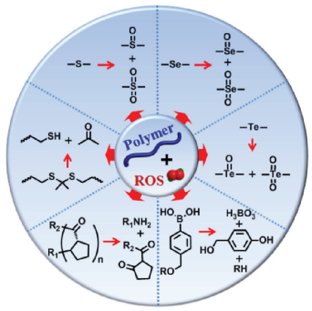
- **What is your scientific background?** *C.W.: I am a hybrid between a chemist and a material scientist.*
- **Why did your choose the area of macromolecular science?** *C.W.: A mix of reasons, the most important probably being that my father is a (now retired) polymer scientist.*
- **What other topics are you working on at the moment?** *C.W.: In addition to nanocellulose-based composites, my group is working on functional supramolecular polymers, bio-inspired mechanochemical transduction processes involving polymers, polymers for optical upconversion, and a few other things.*
- **What prompted you to investigate this topic/problem?** *C.W.: Many polymer/nanocellulose composites have been shown to exhibit useful mechanical properties but the technological exploitation of such materials will only be possible if technologically viable processes for their preparation can be developed. We hope the work described in our paper will contribute to solving this problem.*
- **The best advice I have ever been given is...***C.W.: to strive for the maximum.*
- **If I were not a scientist, I would be a....***C.W.: journalist, chef, or beer brewer.*

For more information on the *Best of Macromolecular Journals*, and to read the full interview, please visit www.best-of-macros.de.

Reactive Oxygen Species (ROS) Responsive Polymers for Biomedical Applications

Q. Xu, C. He,* C. Xiao, X. Chen*

Macromol. Biosci. **2016**, *16*, 635–646
DOI: 10.1002/mabi.201500440



ROS responsive polymeric materials, including nanoparticles, scaffolds, and hydrogels, have received progressive attention for their potential in biomedical applications, such as drug delivery, tissue engineering, and antioxidation in vivo. ROS responsive moieties are capable of displaying unique variation under oxidative stress, such as hydrophobic-hydrophilicity transition and ROS-induced degradation. Representative polymeric materials containing ROS responsive units are summarized in this review.

About the Author

Xuesi Chen received his Ph.D. degree at Waseda University, Japan, in 1997, and completed his post-doctoral fellowship at the University of Pennsylvania, USA, in 1999. He has been a full professor at Changchun Institute of Applied Chemistry, Chinese Academy of Sciences since 1999. He has published over 600 articles in academic journals, which have been cited more than 20000 times to date. In addition, he has applied for over 250 Chinese patents and more than 120 have been authorized. His research interests focus on preparations and biomedical applications of biodegradable polymers, mainly focused on polyethers, polyesters, polypeptides, polycarbonates, and their copolymers.

Ask the Author

- **How was your experience in publishing with Wiley-VCH?** *X.C.: Over the past decade, I have authored over 120 academic papers in the journals of Wiley-VCH, including Advanced Materials, Advanced Functional Materials, Macromolecular Rapid Communication, and Macromolecular Bioscience.*
- **What is your scientific background?** *X.C.: My scientific background includes polymer chemistry and physics, biomaterials, nanotechnology, pharmacy, tissue engineering, and medical devices.*
- **What are the main challenges in the broad area of your research?** *X.C.: The translation of basic research to clinical application.*
- **In few words, how would you describe your research?** *X.C.: My research is to develop advanced biomaterials to enhance human health.*
- **What research topic do you think is likely to become one of the "hot topics" in macromolecular science in the near future?** *X.C.: Smart polymer nanomedicine is likely to become one of the "hot topics" in macromolecular science in the near future.*
- **What other topics are you working on at the moment?** *X.C.:My additional topic at the moment is the industrialization of polylactide and poly(ε-caprolactone).*
- **My favorite molecules are.....***X.C.: polylactide and polypeptide.*
- **What I look for first in a publication is...***X.C.: innovation.*
- **If I were not a scientist, I would be an....***X.C.: entrepreneur.*

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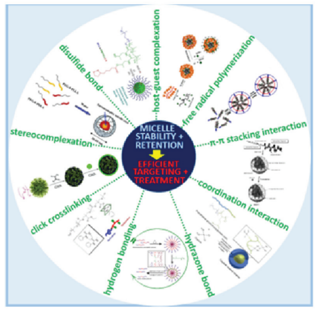
Physico-Chemical Strategies to Enhance Stability and Drug Retention of Polymeric Micelles for Tumor-Targeted Drug Delivery

Y. Shi, T. Lammers, G. Storm, W. E. Hennink*

Macromol. Biosci. **2017**, 17, 1600160
DOI: 10.1002/mabi.201600160



In this review, the most promising physico-chemical approaches to enhance polymeric micelle stability and drug retention are described, and how these strategies contribute to polymeric micelles with promising therapeutic efficacy in animal models, paving the way for clinical translation, is summarized.

About the Author

Wim Hennink obtained his Ph.D. degree at Twente University of Technology in 1985. From 1985 until 1992, he held different positions in the industry, and in 1992 he was appointed as professor at the Faculty of Pharmacy of the University of Utrecht. From 1996 onwards, he has been head of the Department of Pharmaceutics at this university. From 2012–2015, he was scientific director of the Utrecht Institute for Pharmaceutical Sciences (UIPS) and since September 2015 he has been head of the Department of Pharmaceutical Sciences. His main research interests are in the field of polymeric drug delivery systems. He has published over 520 papers and book chapters and is the inventor of 20 patents.

Ask the Author

- **Why did your choose the area of macromolecular science?** *W.E.H.: Our research focuses on the design of biodegradable polymers for pharmaceutical and biomedical applications. In our team, researchers with different backgrounds collaborate on fundamental questions but we have an open eye for possible applications of the different technologies we develop.*

- **What future opportunities do you see (in the light of the results presented in this paper)?** *W.E.H.: Our review summarizes and discusses recent literature to design stable polymeric micelles. These systems have been shown to be suitable for the delivery of anticancer and anti-inflammatory agents, and clinical trials are ongoing. However, to fully exploit the possibilities of polymeric micelles for targeted drug delivery, their stability in the circulation should be improved. On the other hand, the systems should not be too stable because the release of the loaded therapeutic at the target site is hampered. So, the design of systems with controlled (in)stability is scientifically challenging, but once successful, clinical translation is possible given their relatively simple pharmaceutical production.*

- **My favorite molecule is...** *W.E.H.: water. It is such a simple molecule with many unique properties. But importantly, life cannot be imagined without water.*

- **What I look for first in a publication is...** *W.E.H.: to the end of the Introduction. In good papers, a challenging aim is formulated there.*

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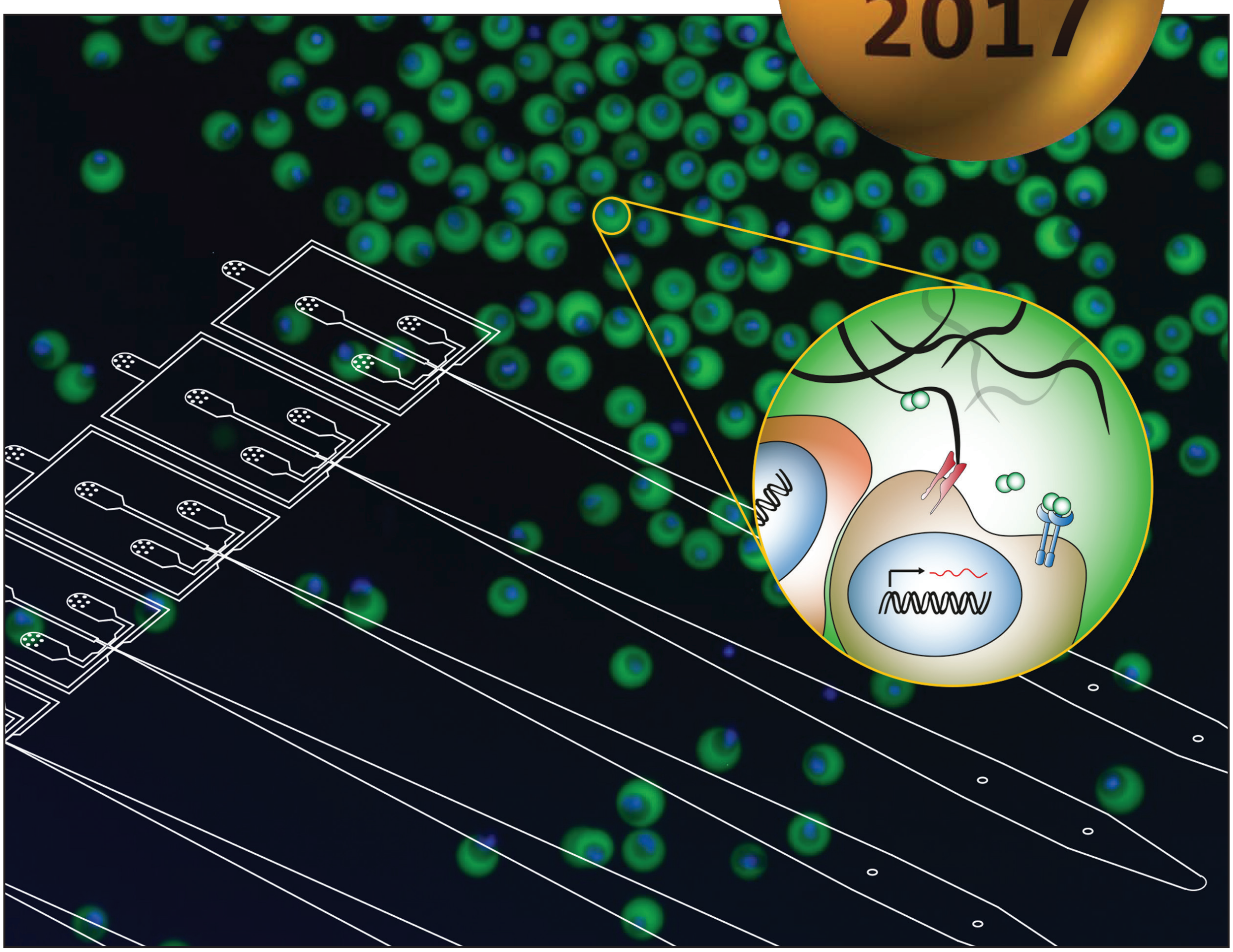

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