

Dr. MARIA VAMVAKAKI
Assistant Professor

Department of Materials Science and Technology
University of Crete
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Nationality: Greek
Date and Place of Birth: 16 June 1970, Wellington/New Zealand
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Skills - Interests

Materials Science and Technology, Polymer Synthesis, Characterization and Applications of Polymers, Colloids, Hybrid (Organic-Inorganic) Materials, Polymeric Surfactants, Water Soluble Polymers, Polyelectrolytes, Polyampholytes, Smart Materials, Supramolecular Assemblies, Surface Modification of Assembled Nanostructures, Micelles, Model Polymer Networks, Hydrogels, Biomedical Applications of Polymers and Hydrogels (Gene Therapy, Drug Delivery), Analytical Chemistry and Applications in Biological Systems, Ion Selective Electrodes (ISEs)

Techniques used:

High Vacuum Techniques, Static and Dynamic Light Scattering, Surface Tensiometry, Zeta Potential, Thermogravimetric Analysis, Differential Scanning Calorimetry, Disc Centrifuge Photosedimentometry (DCP), Branauer-Emmet-Teller (BET), Electron Microscopies (SEM, TEM), Atomic Force Microscopy, Viscometry, Elementary Analysis.

Chromatography: Aqueous and Non-aqueous GPC, HPLC, GC-MS, TLC.

Spectroscopies: FTIR, UV-VIS, NMR, MS.

STUDIES

1994-97 **Doctor of Philosophy in Polymer Science**
School of Chemistry, Physics and Environmental Science, University of Sussex, Brighton, U.K.

1993-94 **Full-time postgraduate student in Analytical Chemistry**
Department of Chemistry, University of Crete, Greece

1989-93 **Bachelor in Chemistry** *Grade: 8.38/10*
Department of Chemistry, University of Crete, Greece

1986-89 **High School Student** *Grade 19.3/20*
3rd General lyceum, Chania, Crete, Greece

WORK EXPERIENCE

2008-Currently **Permanent Assistant Professor** Department of Materials Science and Technology, University of Crete

2004- 2008 **Assistant Professor** Department of Materials Science and Technology, University of Crete

2002-2004 **Visiting Associate Professor** Department of Materials Science and Technology, University of Crete

06/02-2004 **Research Fellow** School of Chemistry, Physics and Environmental Science, University of Sussex, Brighton
"Synthesis and Characterization of Polyampholytes and Water Soluble Polymers used in Smart Surfaces and Catalysis of Organic Reactions"

- 2001-2002 **Visiting Assistant Professor** Department of Materials Science and Technology, University of Crete
- 2000-2001 **Research Fellow** Department of Chemistry, University of Cyprus
"Synthesis, Characterization, Modeling and Applications of Model Polymer Networks"
- 02/01-05/01 **Research Fellow** School of Chemistry Physics and Environmental Science, University of Sussex, Brighton
"Synthesis and Characterization of Water Soluble Polymeric Surfactants by Atom Transfer Radical Polymerization"
- 1999-00 **Visiting Assistant Professor** Department of Physical Sciences, University of Cyprus
- 1998-99 **R&D Chemist** R&D Department of the cosmetic company-Spray-Pack, Athens, Greece
Development and Improvement of Cosmetic and Household Product Formulations
- 1997-98 **Research Fellow** School of chemistry Physics and Environmental Sciences, University of Sussex, Brighton.
"Synthesis, Characterization and Solution Properties of Novel Water Soluble Block Copolymers"
- 1994-97 **Thesis-Laboratory of Polymer Science** University of Sussex, Brighton
"Controlled Structure Water-Soluble Copolymers: Synthesis, Characterization and Application in High Performance Ceramics"
- Supervisors: Prof. S. P. Armes, Prof. N. C. Billingham
 - Industrial supervisor: Dr I. Thompson
 - Collaborations: TAM Ceramics Ltd (A Cookson Company)
 - Sponsors: Cookson Technology Centre (Oxford)
- Synthesis and characterization of novel water-soluble copolymers for applications in environmental friendly media (water)
 - Investigate the interactions between the polymer chains and dielectric ceramic materials
 - Surfactant-like behavior of polymeric materials
 - Literature survey and Patent search
- 1993-1994 **Full-time Post-graduate Student - Laboratory of Analytical Chemistry** Department of Chemistry University of Crete, Greece - 12 months
"Development and Testing of Novel Solid-Contact Ion Selective Electrodes with Stable Internal Electrodes"
Supervisor: Dr N. A. Chaniotakis
Collaboration- Sponsor: Orion Company (United States)
⇒ Patent, 1 publication
- 1992-93 **Diploma Work - Laboratory of Analytical Chemistry** Department of Chemistry University of Crete, Greece-12 months
"Transport of High Energy Biological Molecules through a Liquid Organic Phase Membrane Containing a Charged Ionophore"
Supervisor: Dr N. A. Chaniotakis

Teaching

- 2009-Currently Assistant Professor, Department of Materials Science and Technology, University of Crete. Courses taught: Laboratory of Materials Chemistry
- 2004-Currently Assistant Professor, Department of Materials Science and Technology, University of Crete. Courses taught: Polymer Synthesis, Laboratory of Polymer Synthesis and Characterization and Laboratory of General Chemistry.
- 2002-2004 Visiting Associate Professor, Department of Materials Science and Technology, University of Crete. Courses taught: Laboratory of General Chemistry and Materials Synthesis.
- 2001-2002 Visiting Assistant Professor, Department of Materials Science and Technology, University of Crete. Course taught: Laboratory of General Chemistry.
- 2001 Seminars on Nuclear Magnetic Resonance Spectroscopy (NMR) to colleagues from the industry, Department of Chemistry, University of Cyprus.

1999-00	Visiting Assistant Professor, Department of Physical Sciences, University of Cyprus. Courses taught: Organic Chemistry III, Laboratory of Organic Chemistry I.
1999-00	Visiting Assistant Professor, Department of Chemistry, University of Cyprus. Courses taught: Environmental Chemistry, Laboratory of Analytical Chemistry II.
1993	Tutor on the Chromatographic Methods of Analysis, Laboratory of Analytical Chemistry, University of Crete.
1991	Laboratory Assistant - Undergraduate Laboratory of General Chemistry University of Crete, Greece

Supervision

1997	Vural Bütün (PhD training), University of Sussex
1998	Lindsey Bailey (PhD training), University of Sussex
2000	Co-supervision Aggela Triftaridou and Elena Demosthenous (undergraduate students), University of Cyprus
2000	Co-supervision Stella Hadjiyannakou (PhD), Erica Loizidou and Giorgos Hadjikallis (MPhil), University of Cyprus
2001	Co-supervision Savvas Georgiadis, Theoni Georgiou, Maria Kyriakou and Anna-Maria Christoforou (undergraduate students), University of Cyprus
2001	Co-supervision Theoni Georgiou and Aggela Triftaridou (PhD), University of Cyprus
2002	Co-supervision Theodora Afchoudia (undergraduate student), University of Crete
2002	Co-supervision Vassilis Katsamanis (MPhil), University of Crete
2003	Co-supervision Dafni Palioura and Thanasis Afratis (MPhil), University of Crete
2005-2006	Supervision Kostas Xristodoulakis and Fanourios Krasanakis (undergraduate students), University of Crete
2006-2007	Supervision Panagiotis Falireas and Nikolaos Manolakios (undergraduate students), University of Crete
2005-2008	Supervision Demetra Achilleos (MPhil), University of Crete
2005-2009	Supervision Anca Mateescu (PhD), University of Crete
2006-2008	Supervision Kostas Xristodoulakis (MPhil), University of Crete
2006-2008	Supervision Fanourios Krasanakis (MPhil), University of Crete
2007-2008	Supervision Anastasia Giakoumaki (undergraduate student), University of Crete
2008-2009	Supervision Dafni Moatsou and Elmina Kampouraki (undergraduate students), University of Crete
2007-2010	Supervision Panagiotis Falireas (MPhil), University of Crete
2005-Currently	Supervision Maria Kaliva (research-fellow), University of Crete
2005-Currently	Supervision Demetra Achilleos (PhD), University of Crete
2008-Currently	Supervision Giorgos Pasparakis (research-fellow), University of Crete
2009-Currently	Supervision Dafni Moatsou and Elmina Kampouraki (MPhil), University of Crete
2009-Currently	Supervision Anca Mateescu (research-fellow), University of Crete
2009-Currently	Supervision Konstantinos Stoikos (undergraduate student), University of Crete

Awards-Fellowships

1984-89	Every year awarded <i>first or second</i> among my colleagues
1985	Awarded 3 rd among all final year high school students of Crete in a Panhellenic competition in mathematics
1987	Awarded 3 rd among all final year high school students of Crete in a competition in Physics
1994-86	<i>Human capital and mobility program fellowship</i> from the European Community
1997	D. H. Richards <i>Bursary</i> (Macro Group UK)
1994-97	<i>Sponsored</i> by the Cookson Technology Centre and Bursary from the University of Sussex
2010	"2 nd Best Innovation by an Individual Researcher" Award, BMM group, IESL-FORTH for "Photosensitive materials for two-photon polymerization" Photonics Innovation Village, SPIE Photonics Europe

Participation in Research Projects

1. "Controlled Structure Polymers for Use in High Performance Ceramics" Collaboration of Cookson Technology Centre-TAM Ceramics Ltd with the University of Sussex U.K. 1994-1997
2. "Water-Soluble, Ionic Block Copolymers" ROPA GR/L71803, EPSRC (U.K.), 1997-1999.
3. "Synthesis of Polymeric Surfactants by Atom Transfer Radical Polymerization (ATRP)" Sponsors: Syngenta and the University of Sussex U.K. 2001
4. "Amphiphilic Model Networks" Research Programme of the University of Cyprus, 2000-2003.
5. "Environmental Friendly Emulsions of Pesticides based on Water, using Polymeric Emulsifiers" Programme for Young Scientists, Cyprus, PENEK 2000-2003.
6. "Synthesis and Application of Novel Double-Hydrophilic Star Copolymers as Synthetic Carriers for Gene Therapy" Programme for Young Scientists, Cyprus, PENEK 2001-2004.
7. "Colloidal Catalysts for Synthesis of Important Vitamins and Fragrant Substances: New Approach, New Advantages" NATO Science for Peace Programme, 1999-2004.
8. "Synthesis, Characterization, Modelling and Applications of Amphiphilic Networks by RAFT Polymerization", Research Promotion Foundation, 2004-2006.
9. "Hydrolyzable networks based on mixed hydrolyzable cross-linkers: Synthesis, Characterization and Applications" Programme for Young Scientists, Cyprus, PENEK 2004-2007.
10. "Tailored nanosized metal catalysts for improving activity and selectivity *via* engineering of their structure and local environment" E.U. STREP: NANOCAT NMP3-CT-2005-506621, 2005-2008.
11. "Phenols of industrial wastewaters: detection, conversion, degradation" NATO Science for Peace Programme, 2005-2008.
12. "Synthesis of organic microcavities for optoelectronic devices" Pythagoras II, Ministry of Education and Religious Affairs, 2005-2006.
13. "Development of nanostructured organic/inorganic hybrid materials for random lasing applications" PENED, Ministry of Education and Religious Affairs, 2005-2008. (Leader of the University of Crete Partner)
14. "Biochips based on membrane layers for protein analysis" PENED, Ministry of Education and Religious Affairs, 2005-2008.
15. "Responsive ABC Triblock Copolymers: Solution Properties and Metal Nanoparticle Formation" University of Crete, 2007-2009. (Coordinator)
16. "Hierarchically Organized Metal Organic Catalysts for Continuous and Multi-batch Processes" EU Collaborative Programme, FP7-NMP-2007-SMALL-1, CP-FP 214095-2 HiCat, 2008-2011. (Leader of the IESL-FORTH partner)
17. "Novel Devices based on Hybrid Materials prepared by Laser-Based Nanoparticle Generation in the presence of Functional Organic Polymers" Programme for the promotion of the exchange and scientific cooperation between Greece and Germany, Programme IKYDA 2009, 2009-2010.
18. "Modern polymer-based catalysts and microflow conditions as key elements of innovations in fine chemical synthesis" EU Collaborative Programme, FP7-NMP-2009-LARGE-3, CP-IP 246095-2 POLYCAT, 2010-2013.

Reviewing

Journals:

Biomacromolecules, Chemistry of Materials, Journal of Materials Chemistry, Macromolecules, Soft Matter, Langmuir, Journal of the American Chemical Society, Journal of Colloid and Interface Science, The Journal of Physical Chemistry, Journal of Biomaterials Science, ACS Applied Materials & Interfaces, Bioconjugate Chemistry, Polymer, European Polymer Journal, European Physical Journal E, Materials Chemistry and Physics, Journal of Macromolecular Science, Macromolecular Chemistry & Physics, Journal of Polymer Science Part B, Applied Physics A, Materials Science & Processing, Composites Science and Technology, Journal of Nanostructured Polymers and Nanocomposites, Acta Biomaterialia

Funding Agencies:

*University of Patras – Programme of Basic Research "K. Karatheodoris"
 Programme "Heraklitos"
 Ontario Centres of Excellence Research – Canada
 National Science Foundation - USA
 ACS –Petroleum Research Fund*

Rapporteur for the European Union

EU-SusChem Workshop on *Hybrid Materials, Setting the materials research agenda for Sustainable Chemistry*
Luxembourg, March 2010

External Reviewer for the EU

Final review of the "IDECAT" European Network of Excellence (NoE)

Computer Experience

Use of both PC and Macintosh

Systems-Software: UNIX, Ms-DOS, Windows, Microsoft Office (Word, Excel, etc), Sigma Plot, Origin, Grafit, Word Perfect, Chem Draw Norton Utilities

Languages: Pascal, Fortran

Schools attended: *Windows* and *Introduction to Word for Windows*
E-mail and *Accessing Network Information*

Languages: English, Spanish (poor)

Publications

1. **M. Vamvakaki**, N.A. Chaniotakis, "Ion-Selective Electrode with Stable Internal Electrode" *Analytica Chimica Acta* **1996**, 320(1), 53.
2. V. Butun, C.E. Bennett, **M. Vamvakaki**, A.B. Lowe, N.C. Billingham, S.P. Armes, "Selective Betainisation of Tertiary Amine Methacrylate Block Copolymers" *J. Mater. Chem.* **1997**, 7(9), 1693.
3. **M. Vamvakaki**, S.P. Armes, N.C. Billingham, "Synthesis of Novel Block and Statistical Methacrylate-based Ionomers Containing Acidic, Basic or Betaine Residues" *Polymer* **1998**, 39, 2331.
4. **M. Vamvakaki**, S.P. Armes, N.C. Billingham, "Synthesis and Characterisation of Novel Water-Soluble Statistical Copolymers and Terpolymers containing pendent oligo(ethylene glycol derivatives)" *Polymer* **1999**, 40, 5161.
5. **M. Vamvakaki**, S.P. Armes, N.C. Billingham, "Synthesis and Solution Properties of PEG-based Copolymers Synthesised via Oxyanionic Polymerization" *Macromolecules* **1999**, 32, 2088.
6. V. Bütün, **M. Vamvakaki**, S.P. Armes, N.C. Billingham, "Synthesis and Solution Properties of Novel Hydrophilic-Hydrophilic Block Copolymers via Group-Transfer Polymerization" *Polymer* **2000**, 41, 3173.
7. A.B. Lowe, **M. Vamvakaki**, M.A. Wassall, L. Wong, N.C. Billingham, S.P. Armes, A.W. Lloyd, "Well-defined Sulfobetaine-based Statistical Copolymers as Potential Anti-bioadherent Coatings" *J. Biomed. Mater. Res.* **2000**, 52, 88.
8. M.V. de Paz B   ez, K.L. Robinson, **M. Vamvakaki**, S.F. Lascelles, S.P. Armes, "Synthesis of Novel Cationic Polymeric Surfactants" *Polymer* **2000**, 41, 8501.
9. M.J. Percy, C. Barthet, J.C. Lobb, M.A. Khan, S.F. Lascelles, **M. Vamvakaki**, S.P. Armes, "Synthesis and Characterization of Vinyl Polymer-Silica Colloidal Nanocomposites" *Langmuir* **2000**, 16, 6913.
10. **M. Vamvakaki**, C.S. Patrickios, "Polyelectrolytic Amphiphilic Model Networks in Water: A Molecular Thermodynamic Theory for Their Microphase Separation" *J. Phys. Chem. B* **2001**, 105, 4979.
11. U. Rungsardthong, M. Deshpande, L. Bailey, **M. Vamvakaki**, S.P. Armes, M.C. Garnett, S. Stolnik, "Copolymers of Amine Methacrylate with Poly(ethylene glycol) as Vectors for Gene Therapy" *J. Controlled Release* **2001**, 73(2-3), 359.
12. **M. Vamvakaki**, E.N. Yamasaki, S.C. Hadjiyannakou, C.S. Patrickios, "Characterization of Hydrophilic Networks Synthesized by Group Transfer Polymerization" *Macromol. Symp.* **2001**, 171, 209.

13. **M. Vamvakaki**, N.C. Billingham, S.P. Armes, J.F. Watts, S.J. Greaves, "Controlled structure copolymers for the dispersion of high-performance ceramics in aqueous media" *J. Mater. Chem.* **2001**, *11*(10), 2437-2444.
14. **M. Vamvakaki**, G.-F. Unali, V. Bütün, S. Boucher, K.L. Robinson, N.C. Billingham, S.P. Armes, "Effect of Partial Quaternization on the Solution Properties of Tertiary Amine-based Polymeric Surfactants: Unexpected Separation of Surface Activity and Cloud Point Behavior" *Macromolecules* **2001**, *34*, 6839.
15. **M. Vamvakaki**, S.C. Hadjiyannakou, E. Loizidou, C.S. Patrickios, S.P. Armes, and N.C. Billingham, "Facile Synthesis of Novel Networks with Nano-Engineered Structures: Cross-Linked Star Homopolymers" *Chem. Mater.* **2001**, *13*, 4738-4744.
16. E. Demosthenous, S.C. Hadjiyannakou, **M. Vamvakaki**, C.S. Patrickios, "Block Polyampholyte Model Networks: Synthesis by Group Transfer Polymerization and Characterization of the Aqueous Degree of Swelling" *Macromolecules* **2002**, *35*, 2252-2260.
17. A.I. Triftaridou, **M. Vamvakaki**, C.S. Patrickios, "Amphiphilic Diblock and ABC Triblock Methacrylate Copolymers: Synthesis and Aqueous Solution Characterization" *Polymer* **2002**, *43*, 2921-2926.
18. A.I. Triftaridou, S.C. Hadjiyannakou, **M. Vamvakaki**, C.S. Patrickios, "Synthesis, Characterization and Modeling of Cationic Amphiphilic Model Networks: Effects of Polymer Composition and Architecture" *Macromolecules* **2002**, *35*, 2506-2513.
19. **M. Vamvakaki**, C.S. Patrickios, "Synthesis and Characterization of Electrolytic Amphiphilic Model Networks Based on Cross-linked Stars: Effects of Star Architecture" *Chem. Mater.* **2002**, *14*, 1630-1638.
20. M.C. Deshpande, M.C. Garnett, **M. Vamvakaki**, L. Bailey, S.P. Armes, S. Stolnik, "Influence of polymer architecture on the structure of complexes formed by PEG-tertiary amine methacrylate copolymers and phosphorothioate oligonucleotide" *J. Controlled Release* **2002**, *81*(1), 185-199.
21. S. Georgiades, **M. Vamvakaki**, C.S. Patrickios, "Synthesis and Characterization of Double Hydrophilic Cross-linked Star Polymers Bearing Poly(ethylene glycol) and Carboxylic Acid Groups" *Macromolecules* **2002**, *35*, 4903-4911.
22. A.I. Triftaridou, **M. Vamvakaki**, C.S. Patrickios, L. Lue, "Synthesis, Characterization and Modeling of ABC Triblock Terpolymers: The Effect of Block Sequence" *Macromol. Symp.* **2002**, *183*, 133-138.
23. A.S. Lee, V. Butun, **M. Vamvakaki**, S.P. Armes, J.A. Pople, A.P. Gast, "Structure of pH-Dependent Block Copolymer Micelles: Charge and Ionic Strength Dependence" *Macromolecules* **2002**, *35*, 8540-8551.
24. G. Hadjikallis, S.C. Hadjiyannakou, **M. Vamvakaki**, C.S. Patrickios, "Synthesis and Aqueous Solution Characterization of Novel Diblock Polyampholytes Containing Imidazole" *Polymer* **2002**, *43*, 7269-7273.
25. E. Loizou, A.I. Triftaridou, T.K. Georgiou, **M. Vamvakaki**, C.S. Patrickios, "Cationic Double-Hydrophilic Model Networks: Synthesis, Characterization, Modeling and Protein Adsorption Studies" *Biomacromolecules* **2003**, *4*, 1150-1160.
26. M.C. Deshpande, M.C. Davies, M.C. Garnett, P.M. Williams, D. Armitage, L. Bailey, **M. Vamvakaki**, S.P. Armes and S. Stolnik, "The effect of poly(ethylene glycol) molecular architecture on cellular interaction and uptake of DNA complexes" *J. Controlled Release* **2004**, *97*(1), 143-156.
27. S.C. Hadjiyannakou, **M. Vamvakaki**, C.S. Patrickios, "Synthesis, Characterization and Evaluation of Amphiphilic Diblock Copolymer Emulsifiers Based on Hexa(Ethylene Glycol) Methacrylate and Benzyl Methacrylate" *Polymer* **2004**, *45*, 3681-3692.
28. S.Couderc-Azouani, J. Sidhu, T.K. Georgiou, D.C. Charalambous, **M. Vamvakaki**, C.S. Patrickios, D.M. Bloor, J. Penfold, J.F. Holzwarth, E. Wyn-Jones, "The Binding of Sodium Dodecyl Sulfate to Linear and Star Homopolymers: The Non-ionic Polymer, Poly(Methoxy Hexaethylene Glycol) Methacrylate and the Polycation, Poly(2-(Dimethylamino)ethyl Methacrylate: Electromotive Force, Isothermal Titration Calorimetry, Surface Tension and Small Angle Neutron Scattering Measurements," *Langmuir* **2004**, *20*, 6458-6469.
29. M.S. Kyriakou, S.C. Hadjiyannakou, **M. Vamvakaki**, C.S. Patrickios, "Synthesis, Characterization and Evaluation as Emulsifiers of Amphiphilic-Ionizable Aromatic Methacrylate ABC Triblock Terpolymers" *Macromolecules* **2004**, *37*, 7181-7187.

30. T.K. Georgiou, **M. Vamvakaki**, C.S. Patrickios, "Microphase Separation Under Constraints: A Molecular Thermodynamic Theory for Polyelectrolytic Amphiphilic Model Networks in Water" *Polymer* **2004**, *45*, 7341-7355.
31. T.K. Georgiou, **M. Vamvakaki**, C.S. Patrickios, E.N. Yamasaki and L.A. Phylactou, "Nanoscale Cationic Methacrylate Star Homopolymers: Synthesis by Group Transfer Polymerization, Characterization and Evaluation as Transfection Reagents" *Biomacromolecules* **2004**, *5*, 2221-2229.
32. **M. Vamvakaki**, L. Papoutsakis, V. Katsamanis, T. Afchoudia, S.H. Anastasiadis, P.G. Fragouli, H. Iatrou, N. Hadjichristidis, S.P. Armes, S. Sidorov, D. Zhirov, V. Zhirov, M. Kostylev and L.M. Bronstein, "Micellization in pH-sensitive amphiphilic block copolymers in aqueous media and the formation of metal nanoparticles" *Faraday Discuss.* **2005**, *128*, 129-147.
33. A.I. Triftaridou, **M. Vamvakaki**, C.S. Patrickios, N. Stavrouli, C. Tsitsilianis, "Synthesis of Amphiphilic (ABC)_n Multiarm Star Triblock Terpolymers" *Macromolecules* **2005**, *38*, 1021-1024.
34. L.M. Bronstein, **M. Vamvakaki**, M. Kostylev, V. Katsamanis, B. Stein, S.H. Anastasiadis, "Transformations of Poly(Methoxy hexa(ethylene glycol) methacrylate)-*b*-(2-(Diethyl amino)ethyl methacrylate) Block Copolymer Micelles upon Metallation" *Langmuir* **2005**, *21*, 9747-9755.
35. T. K. Georgiou, **M. Vamvakaki**, L. A. Phylactou, C. S. Patrickios, "Synthesis, Characterization, and Evaluation as Transfection Reagents of Double-Hydrophilic Star Copolymers: Effect of Star Architecture" *Biomacromolecules* **2005**, *6*, 2990 -2997.
36. **M. Vamvakaki**, D. Palioura, A. Spyros, S. P. Armes, S. H. Anastasiadis, "Dynamic Light Scattering vs. ¹H NMR Investigation of pH-Responsive Diblock Copolymers in Water" *Macromolecules* **2006**, *39*, 5106-5112.
37. A.I. Triftaridou, D. Kafouris, **M. Vamvakaki**, T. K. Georgiou, T. C. Krasia, E. Themistou, N. Hadjiantoniou, C. S. Patrickios, "Three different types of quasi-model networks: synthesis by group transfer polymerization and characterization" *Polym. Bull.* **2007**, *58*, 185-190.
38. S. Biggs, K. Sakai, T. Addison, A. Schmid, S. P. Armes, **M. Vamvakaki**, V. Butun, G. Webber, "Layer-by-Layer Formation of Smart Particle Coatings using Oppositely Charged Block Copolymer Micelles" *Adv. Mater.* **2007**, *19*, 247-250.
39. D. Palioura, S. P. Armes, S. H. Anastasiadis, **M. Vamvakaki**, "Metal Nanocrystals Incorporated within pH-Responsive Microgel Particles" *Langmuir* **2007**, *23*, 5761-5768.
40. A. I. Triftaridou, **M. Vamvakaki**, C. S. Patrickios, "Cationic Amphiphilic Model Networks Based on Symmetrical ABCBA Pentablock Terpolymers: Synthesis, Characterization and Modeling" *Biomacromolecules* **2007**, *8*, 1615-1623.
41. **M. Vamvakaki**, C. S. Patrickios, Peter Lindner, Michael Gradzielski, "Amphiphilic Networks Based on Cross-Linked Star Polymers: A Small-Angle Neutron Scattering Study" *Langmuir* **2007**, *23*, 10433-10437.
42. K. Sakai, **M. Vamvakaki**, E.G. Smith, E.J. Wanless, S.P. Armes, S. Biggs, "Adsorption Characteristics of Zwitterionic Diblock Copolymers at the Silica/Aqueous Solution Interface" *J. Colloid Interface Sci.* **2008**, *317*, 383-394.
43. K. Sakai, G. B. Webber, C. -D. Vo, E. J. Wanless, **M. Vamvakaki**, V. Bütün, S. P. Armes, S. Biggs, "Characterisation of Layer-by-Layer Self-Assembled Multilayer Films of Diblock Copolymer Micelles" *Langmuir* **2008**, *24*, 116-123.
44. **M. Vamvakaki**, C.S. Patrickios, "Synthesis and Characterization of the Swelling and Mechanical Properties of Amphiphilic Ionizable Model Conetworks Containing *n*-Butyl Methacrylate Hydrophobic Blocks" *Soft Matter* **2008**, *4*, 268-276.
45. M. Farsari A. Ovsianikov, **M. Vamvakaki**, B.N. Chichkov, C. Fotakis, "Fabrication of three-dimensional photonic crystal structures containing an active nonlinear optical chromophore" *Appl. Phys. A* **2008**, *93*, 11-15.
46. A. Ovsianikov, J. Viertl, B. N. Chichkov M. Oubaha, B. D. MacCraith I. Sakellari, A. Giakoumaki, D. Gray, **M. Vamvakaki**, M. Farsari, C. Fotakis, "Two-photon polymerization of hybrid sol-gel materials for photonics applications" *Laser Chemistry* **2008**, Article ID 493059.
47. A. Ovsianikov, J. Viertl, B. Chichkov, M. Oubaha, B. MacCraith, I. Sakellari, A. Giakoumaki, D. Gray, **M. Vamvakaki**, M. Farsari and C. Fotakis, "Ultra-low shrinkage hybrid photosensitive material for two-photon polymerization microfabrication" *ACS Nano* **2008**, *2*, 2257-2262.
48. S. H. Anastasiadis and **M. Vamvakaki**, "Synthesis of Metallic Nanoparticles within pH-sensitive Polymeric Matrices" *Int. J. Nanotechnol.* **2009**, *6*, 46-70.

49. A. Ovsianikov, X. Shizhou, B. N. Chichkov, M. Farsari, **M. Vamvakaki** and C. Fotakis, “Shrinkage of microstructures produced by two-photon polymerization of Zr-based hybrid photosensitive materials” *Optics Express* **2009**, *17*, 2143-2148.
50. F. Claeysens, E. A. Hasan, A. Gaidukeviciute, D. S. Achilleos, A. Ranella, C. Reinhardt, A. Ovsianikov, X. Shizhou, C. Fotakis, **M. Vamvakaki**, B. N. Chichkov and M. Farsari, “Three-dimensional Biodegradable Structures Fabricated by Two-Photon Polymerization” *Langmuir* **2009**, *25*, 3219-3223.
51. K. E. Christodoulakis, D. Palioura, S. H. Anastasiadis and **M. Vamvakaki**, “Metal nanocrystals embedded within polymeric nanostructures: Effect of polymer-metal compound interactions” *Topics in Catalysis: Special Issue* **2009**, *52*, 394-411.
52. A. Mateescu, J. Ye, R. Narain and **M. Vamvakaki**, “Synthesis and Characterization of Novel Glycosurfaces by ATRP” *Soft Matter* **2009**, *5*, 1621-1629.
53. G. Pasparakis, **M. Vamvakaki**, N. Krasnogor and C. Alexander, “Diol-boronic acid complexes as chemical logic gates integrated by responsive polymers” *Soft Matter* **2009**, *5*, 3839-3841.
54. K. E. Christodoulakis, **M. Vamvakaki**, “Amphoteric Core-Shell Microgels: Contraphilic Two Compartment Colloidal Particles” *Langmuir* **2010**, *26*, 639-647.
55. R. Narain, X. Jiang, **M. Vamvakaki**, “Copper-Catalyzed Bimolecular Coupling of α,ω -dibromide Functionalized Poly(γ -caprolactone)” *Macromolecules* **2010**, *43*, 3228-3232.
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58. E. Stratakis, A. Mateescu, M. Barberoglou, **M. Vamvakaki**, C. Fotakis and S. H. Anastasiadis “From Superhydrophobicity and Water Repellency to Superhydrophilicity: Smart Polymer-Functionalized Surfaces” *Chem. Comm.* **2010**, *46*, 4136 - 4138.
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60. K. E. Christodoulakis, **M. Vamvakaki**, “pH-responsive microgel particles comprising solely basic or acidic residues” *Macromolecular symposia* **2010**, *291/292*, 106-114.
61. I. Sakellari, A. Gaidukeviciute, A. Giakoumaki, D. Gray, C. Fotakis, M. Farsari, **M. Vamvakaki**, C. Reinhardt, A. Ovsianikov, and B. N. Chichkov “Two-photon polymerization of titanium containing sol-gel composites for three-dimensional structure fabrication” *Appl. Phys. A* **2010**, *100*, 359-364.
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63. D. S. Achilleos and **M. Vamvakaki** “Multi-responsive Spiropyran-based Copolymers Synthesized by Atom Transfer Radical Polymerization” *Macromolecules* **2010**, *43*, 7073–7081.
64. M. Farsari, **M. Vamvakaki** and B. N. Chichkov, “Multiphoton Polymerization of Hybrid Materials” *J. Opt.* **2010**, accepted (**invited review**).
65. E. Pavlopoulou, G. Portale, K. E. Christodoulakis, **M. Vamvakaki**, W. Bras and S. H. Anastasiadis* “Following the Synthesis of Metal Nanoparticles within pH-responsive Microgel Particles by SAXS” *Macromolecules* **2010**, accepted.
66. G. Pasparakis and **M. Vamvakaki** (**invited review**) Tentative title: “Multiresponsive Polymers” in preparation for submission to *Polymer Chemistry*, date due: November 2010.
67. D. S. Achilleos and **M. Vamvakaki*** “Surface-Initiated Atom Transfer Radical Polymerization from Inorganic Nanoparticles” *in preparation*.
68. A. Mateescu, R. Narain, M. Ahmed, Z. Deng, M. Ebara A. Saito, Y. Sawa and **M. Vamvakaki*** “Cell Adhesion and Spreading Behavior on Glycopolymer Brushes” *in preparation*.
69. Anca Mateescu, and **M. Vamvakaki*** “Stimuli Responsive Homopolymer and Block Polymer Brushes by Surface-Initiated Polymerization” *in preparation*.

Conferences-Presentations

1. Analytical Chemistry, Conference University of Crete, July 1994.
2. N.A. Chaniotakis, J.K. Tsagatakis, **M. Vamvakaki**, K. Jurkschat, "Novel Tin (IV)-Based Potentiometric Phosphate Carriers" 1994 Pittsburgh, Conference and Exposition, Pittcon '94, McCormick Place Chicago, Illinois USA February 27-March 4, 1994, Abstract, 1198.
3. N.A. Chaniotakis, J. Tsagatakis, **M. Vamvakaki**, G. Andredakis, S.J. West "Partitioning of Anions into Lipophilic Organic Phases Determined by Direct Conductivity Measurements" 1995 Pittsburgh Conference and Exposition, Pittcon '95, New Orleans, Louisiana, March 5-10, 1995, 156P.
4. Fifth Family Meeting of the Macro-Group UK-Aspects of Polymer Chemistry, Loughborough, April 1995.
5. Third UK Colloid and Surface Science Student Meeting University of Hull, July 1995.
6. **M. Vamvakaki**, S.P. Armes, N.C. Billingham, "Synthesis of Methacrylate-Based Copolymers *via* Group Transfer Polymerization" Sixth Macro-Group UK Family Meeting-Aspects of Contemporary Polymer Science, Manchester, April 1996.
7. **M. Vamvakaki**, V. Butun, S.P. Armes, N.C. Billingham, "Synthesis and Solution Properties of Novel Hydrophilic-Hydrophilic Block Copolymers *via* Group Transfer Polymerization" Macro-Group UK Spring Meeting '97 for Younger Researchers Queen's Hotel, Leeds, April 1997.
8. **M. Vamvakaki**, S.P. Armes, N.C. Billingham, "Synthesis of Methacrylate-Based Copolymers *via* Group-Transfer-Polymerization" *Polym. Prepr., Am. Chem. Soc.*, **1997**, 38(1) 500.
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10. 9th Light Scattering University, Santa Barbara, CA, October 1998.
11. L. Bailey, **M. Vamvakaki**, N.C. Billingham, S.P. Armes, "Synthesis and Aqueous Solution Properties of Novel Hydrophilic/Hydrophilic Block Copolymers Based on Tertiary Amine Methacrylates and Poly(ethylene oxide)" *Polym. Prepr., Am. Chem. Soc.*, **1999**, 40(2), 263, 218th ACS National Meeting, New Orleans, USA, August 1999.
12. S.C Hadjiyiannakou, **M. Vamvakaki**, C.S. Patrickios, E.N. Yamasaki, L.A. Phylactou, "Double-Hydrophilic Block Copolymers Bearing Diol and Tertiary Amine Groups: Synthesis, Aqueous Solution Characterization and Potential Application for Gene Therapy" IUPAC Polymer Congress, Warsaw, Poland, July 2000.
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14. **M. Vamvakaki**, C.S. Patrickios, "Polyelectrolytic Amphiphilic Model Networks in Water: Synthesis, Characterization of the Degree of Swelling and Microphase Separation Theory" ECIS Conference, Patras, Greece, September 2000.
15. S.C Hadjiyiannakou, **M. Vamvakaki**, C.S. Patrickios, E.N. Yamasaki, L.A. Phylactou, "Double-Hydrophilic Diblock Copolymers Bearing Diol and Tertiary Amine Groups: Synthesis, Aqueous Solution Characterization and Potential Application for Gene Therapy" ECIS Conference, Patras, Greece, September 2000.
16. C.S. Patrickios, **M. Vamvakaki**, "Polyelectrolytic Amphiphilic Model Networks In Water: Synthesis and Characterization," *Polym. Prepr., Am. Chem. Soc.*, **2001**, 42(1), 657, 221st ACS National Meeting, San Diego, USA, April 2001.
17. E. Loizidou, D. Haralambous, **M. Vamvakaki**, C.S. Patrickios, T. Krasia, M. Antonietti, "AB Diblock and ABC Triblock Amphiphilic Copolymers Containing Fluorine: Synthesis by Group Transfer Polymerization (GTP) and Aqueous Solution Characterization" *ABSTR. PAP. AM. CHEM. S.* 221: 202-COLL Part 1, 221st ACS National Meeting, San Diego, USA, April 2001.
18. S.C. Hadjiyiannakou, T. Georgiou, **M. Vamvakaki**, C.S. Patrickios, "Double-Hydrophilic Linear and Star Copolymers Bearing Diol and Tertiary Amine Groups: Synthesis and Aqueous Solution Characterization" *ABSTR. PAP. AM. CHEM. S.* 221: 204-COLL Part 1, 221st ACS National Meeting, San Diego, USA, April 2001.

19. **M. Vamvakaki**, C.S. Patrickios, "Model Networks Based on Cross-linked Star Polymers: Synthesis and Swelling Behavior" IUPAC 2001, Crete, Greece, October 2001.
20. A.I. Triftaridou, **M. Vamvakaki**, C.S. Patrickios, L. Lue, "Synthesis, Aqueous Solution Characterization, and Modeling of Amphiphilic ABC Triblock Copolymers" IUPAC 2001, Crete, Greece, October 2001.
21. **M. Vamvakaki**, C.S. Patrickios, "Amphiphilic Model Networks Based on Cross-linked Star Polymers" Seventh Cyprus-Greece Chemistry Conference, Nicosia, Cyprus, November 2001.
22. S.C. Hadjiyiannakou, **M. Vamvakaki**, C.S. Patrickios, E. Hadjikostas, A. Hadjimanolis, D. E. Soukiouoglou, P. Alexandridis, "Characterization of Poly(ethylene oxide) - block - Poly(propylene oxide) - block - Poly(ethylene oxide) Triblock Copolymers and Their Evaluation as Emulsifiers" Seventh Cyprus-Greece Chemistry Conference, Nicosia, Cyprus, November 2001.
23. A.I. Triftaridou, **M. Vamvakaki**, C.S. Patrickios, C. Tsitsilianis, "Water-Soluble Linear and Star ABC Triblock Terpolymers: Synthesis and Characterization" Seventh Cyprus-Greece Chemistry Conference, Nicosia, Cyprus, November 2001.
24. T. Georgiou, S.C. Hadjiyiannakou, **M. Vamvakaki**, C.S. Patrickios, "Synthesis and Aqueous Solution Characterization of Homopolymers and Double - Hydrophilic Block and Star Copolymers Bearing Diol Groups" Seventh Cyprus-Greece Chemistry Conference, Nicosia, Cyprus, November 2001.
25. A.I. Triftaridou, **M. Vamvakaki**, C.S. Patrickios, "Synthesis, Characterization, and Modeling of ABC Triblock Copolymers" Seventh Cyprus-Greece Chemistry Conference, Nicosia, Cyprus, November 2001.
26. **M. Vamvakaki**, "Controlled Structure Copolymers for Ceramic Dispersion" 5th Panhellenic Polymer Conference, Heraklion, Crete, December 2001.
27. T. Georgiou, E. Themistou, A. I. Triftaridou, S. C. Hadjiyiannakou, **M. Vamvakaki**, C.S. Patrickios, "Nano-engineered model networks: Synthesis, characterization and modelling" *ABSTR. PAP. AM. CHEM. S. 223*: 016-POLY Part 2, 223rd ACS National Meeting, Orlando, Florida, April 2002.
28. **M. Vamvakaki**, A. I. Triftaridou and C. S. Patrickios, "Synthesis, Characterization and Modeling of Polyelectrolytic Amphiphilic Model Hydrogels" Molecular Order and Mobility in Polymer Systems, 4th International Symposium, St. Petersburg, Russia, June 2002.
29. **M. Vamvakaki**, C. S. Patrickios, "Electrolytic Cross-linked Star Polymers in Water: Synthesis and Characterization of the Degree of Swelling" International Conference on Polymer Synthesis, Warwick, UK, July 2002.
30. L. Papoutsakis, P. Fragouli, **M. Vamvakaki**, H. Iatrou, S. Sidorov, V. Zhurov, L. Bronstein, N. Hadjichristidis and S.H. Anastasiadis, "The effect of pH on the micellization of PEO-b-P2VP block copolymers in aqueous solution and the formation of metal nanoparticles" XVIII Panhellenic Conference of Solid State Physics and Material Science, Crete, Greece, September 2002.
31. **M. Vamvakaki**, C. S. Patrickios, S. P. Armes and N. C. Billingham, "Synthesis, Characterization and Applications of Water Compatible Polymeric Materials" 19th Pan-Hellenic Conference on Chemistry, Heraklion, Greece, November, 2002.
32. L. Papoutsakis, P. Fragouli, **M. Vamvakaki**, H. Iatrou, S. Sidorov, V. Zhurov, L. Bronstein, N. Hadjichristidis, and S. H. Anastasiadis "Micellization and Metal Nanoparticle Formation in Aqueous Solutions of PEO-b-PV2P Diblock Copolymers as a Function of pH" 19th Pan-Hellenic Conference on Chemistry, Heraklion, Greece, November, 2002.
33. M. Kostylev, L. Bronstein, J. W. Zwanziger, L. Papoutsakis, **M. Vamvakaki**, S. H. Anastasiadis, "Micellar Behavior and Metal Nanoparticle Formation in pH-Sensitive Amphiphilic Block Copolymers in Water" AIChE Annual Meeting, Indianapolis, IN, November 2002.
34. **M. Vamvakaki**, B. Katsamanis, T. Afchoudia, L. Papoutsakis, S. Sidorov, V. Zhurov, M. Kostylev, S. P. Armes N. C. Billingham, L. Bronstein, and S. H. Anastasiadis "pH-Responsive Diblock Copolymers in Aqueous Solution: Micellization and Metal Nanoparticle Formation" Solid/Fluid Interfaces, San Feliu de Guixols, Spain, March 2003.
35. A.I. Triftaridou, **M. Vamvakaki**, C.S. Patrickios "Synthesis and Characterization of Amphiphilic Linear and Star ABC Triblock Copolymers" *ABSTR. PAP. AM. CHEM. S. 225*: 291-COLL Part 1, 225th ACS National Meeting, New Orleans, USA, March 2003.

36. S.C. Hadjiyannakou, **M. Vamvakaki**, C.S. Patrickios “Synthesis and Characterization of Amphiphilic Diblock Copolymer Emulsifiers” *ABSTR. PAP. AM. CHEM. S. 225*: 292-COLL Part 1, 225th ACS National Meeting, New Orleans, USA, March 2003.
37. S. H. Anastasiadis, **M. Vamvakaki**, L. Papoutsakis, V. Katsamanis, P. Fragouli, H. Iatrou, N. Hadjichristidis, S. Sidorov, V. Zhirov, M. Kostylev and L. Bronstein “Micellar Behavior and Metal Nanoparticle Formation in pH-sensitive Amphiphilic Block Copolymers in Aqueous Media” EMCC-3, 3rd Chemical Engineering Conference for Collaborative Research in Eastern Mediterranean, Thessaloniki, Greece, May 2003.
38. V. Katsamanis, L. Papoutsakis, **M. Vamvakaki**, S. Sidorov, V. Zhirov, M. Kostylev, L. Bronstein, and S. H. Anastasiadis, “Micellization and Metal Nanoparticle Formation in Aqueous Solutions of PHEGMA-*b*-PDEAEMA Diblock Copolymers” 4th Panhellenic Chemical Engineering Conference, Patras, Greece, May 2003.
39. **M. Vamvakaki**, S.P. Armes and N.C. Billingham “Double Hydrophilic Block Copolymers” 4th Panhellenic Chemical Engineering Conference, Patras, Greece, May 2003.
40. **M. Vamvakaki**, L. Papoutsakis, V. Katsamanis, S. H. Anastasiadis, P. Fragouli, H. Iatrou, N. Hadjichristidis, S. P. Armes, S. Sidorov, D. Zhirov, V. Zhirov, M. Kostylev and L. Bronstein, “Micellization and Metal Nanoparticle Formation in pH-sensitive Amphiphilic Block Copolymers in Aqueous Media” 226th National Meeting, American Chemical Society, New York, USA, September 2003.
41. T. K Georgiou, E. N Yamasaki, L. A Phylactou, **M. Vamvakaki**, and C. S Patrickios, “Cationic methacrylate homo- and co-polymer stars: Synthesis, characterization and evaluation as transfection Reagents” 227th National Meeting, American Chemical Society, Anaheim, USA, March-April 2004.
42. S. H. Anastasiadis, V. Katsamanis, T. Afchoudia, M. Vamvakaki, S. Sidorov, M. Kostylev and L. Bronstein “Aqueous Solution Behavior and Metal Nanoparticle Formation in pH-responsive Amphiphilic Diblock Copolymers” General Meeting 04, American Physical Society, Montreal, Canada, March 2004, Bull. Amer. Phys. Soc. 49, 1342 2004.
43. **M. Vamvakaki**, V. Katsamanis, L. Papoutsakis, S. H. Anastasiadis, M. Kostylev and L. Bronstein, “Aqueous Solution Properties of pH-responsive PHEGMA-*b*-PDEAEMA Diblock Copolymers and the Formation of Colloidal Metal Particles” INEOS 50 Modern Trends in Organoelement and Polymer Chemistry, Moscow, Russia, May-June 2004.
44. **M. Vamvakaki**, “Functional copolymers as ceramic dispersants in aqueous media” From Hard to Ultrasoft Colloids (HUSC), Koutouloufari, Crete, Greece, June 2004.
45. **M. Vamvakaki**, V. Katsamanis, L. Papoutsakis, S. H. Anastasiadis, M. Kostylev and L. Bronstein, “pH-Sensitive Diblock Copolymers: Aqueous Solution Properties and the Formation of Platinum Metal Nanoparticles” From Hard to Ultrasoft Colloids (HUSC), Koutouloufari, Crete, Greece, June 2004.
46. M. Vamvakaki, V. Katsamanis, L. Papoutsakis, T. Afchoudia, S. H. Anastasiadis, P. Fragouli, H. Iatrou, N. Hadjichristidis, S. P. Armes, S. Sidorov, D. Zhirov, V. Zhirov, M. Kostylev and L. Bronstein “Micellar Behavior and Metal Nanoparticle Formation in pH-sensitive Amphiphilic Block Copolymers in Aqueous Media” *128th Faraday Discussion on "Self-Organising Polymers"*, University of Leeds, U.K. July 2004.
47. C. S. Patrickios, T. K. Georgiou, E. Themistou, E. N. Yamasaki, **M. Vamvakaki** and L. A. Phylactou, “Polymethacrylate Stars as Synthetic Gene Delivery Vehicles” 2nd International Conference on Tissue Engineering, Crete, Greece, May 2005.
48. **M. Vamvakaki**, D. Palioura, A. Spyros, and S. H. Anastasiadis, “Responsive Polymeric Materials and Formation of Metal Nanocrystals” 5th Panhellenic Chemical Engineering Conference, Thessaloniki, Greece, May 2005.
49. S. H. Anastasiadis, **M. Vamvakaki**, D. Palioura, V. Katsamanis, T. Afchoudia, A. Spyros, M. Kostylev, L. M. Bronstein, Proceedings of the European Polymer Congress 2005 *European Polymer Federation*, June 2005, Moscow, Russia.
50. C. S Patrickios, **M. Vamvakaki**, A.I. Triftaridou, E. Themistou, T. K. Georgiou, D. Kafouris, N. Hadjiantoniou, M. Karbarz, “Three Different Types of Polymethacrylate Model Networks: Synthesis, Characterization and Modelling” Polymer Gels and Networks on the occasion of 75th birthday of Prof. Karel Dusek, 44th Microsymposium on Macromolecules, Prague, Czech Republic, July 2005.

51. G. B. Webber, K. Sakai, E. J. Wanless, S. P. Armes, **M. Vamvakaki**, V. Bütün, S. Biggs, "Preparation, Characterisation and Utilisation of Diblock Copolymer Micelle Thin-Films and Multilayers" 7th World Congress of Chemical Engineering, Glasgow, United Kingdom, July 10-14, 2005, pp 86505/1-86505/ 10.
52. K. Sakai, G. B. Webber, V. Bütün, **M. Vamvakaki**, S. P. Armes, S. Biggs, "Self-Assembled Diblock Copolymers as Nanomaterial Building Blocks" 7th World Congress of Chemical Engineering Glasgow, United Kingdom, July 10-14, 2005, pp 101083/1-101083/9.
53. A. Afratis, **M. Vamvakaki**, K. Chrissopoulou, S.H. Anastasiadis, "Hydrophilic organic/inorganic nanocomposites" XXI Panhellenic Conference of Solid State Physics and Material Science, Nicosia, Cyprus, August 2005.
54. **M. Vamvakaki**, S. H. Anastasiadis, T. K. Georgiou, C. S. Patrickios "pH-responsive Polymer Hydrogels: Synthesis, Characterization and Metal Nanoparticle Formation" International Symposium on Polymer Conetworks, Gels and Membranes Budapest, Hungary, September 2005.
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56. T. K. Georgiou, C. S. Patrickios, L. A. Phylactou, **M. Vamvakaki**, E. N. Yamasaki, "Cationic Hydrophilic Homo and Co-Polymer Stars: Synthesis, Characterization and Evaluation as Transfection Reagents" 231st ACS National Meeting, Atlanta, USA, March 2006.
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59. **M. Vamvakaki**, "Functional Polymeric Materials: Synthesis, Characterization and Applications" 6th Panhellenic Polymer Conference, Patras, Greece, November 2006.
60. T. K. Georgiou, E. N. Yamasaki, L. A. Phylactou, **M. Vamvakaki**, C. S. Patrickios, "Synthetic Polymer Gene Delivery Vehicles: The Case of Polymethacrylate Stars" 6th Panhellenic Polymer Conference, Patras, Greece, November 2006.
61. **M. Vamvakaki**, D. Palioura, S. P. Armes, S. H. Anastasiadis, "Metal Nanocrystals Incorporated within pH-Responsive Microgel Particles" 6th Panhellenic Polymer Conference, Patras, Greece, November 2006.
62. **M. Vamvakaki**, D. Palioura, S. H. Anastasiadis, and S. P. Armes, "Metal nanocrystals incorporated within pH-responsive microgel particles", General Meeting 07, American Physical Society, Denver, CO, U.S.A, March 2007.
63. **M. Vamvakaki**, D. Palioura, S. P. Armes, S. H. Anastasiadis, "pH-responsive Polymer Microgel Particles: Matrices for Metal Nanocrystals" *ABSTR. PAP. AM. CHEM. S.* 223: 016-POLY Part 2, 233rd ACS National Meeting & Exposition, Chicago, IL, March 2007.
64. **M. Vamvakaki**, "Water-Compatible Functional Synthetic Polymers" 6th Panhellenic Chemical Engineering Conference, Athens, Greece, May 2007.
65. E. Pavlopoulou, K. Karagianni, K. Chrissopoulou, **M. Vamvakaki**, S. H. Anastasiadis, M. Moschakou, H. Iatrou, S. Pispas, and N. Hadjichristidis, "Miceellization of block copolymers" 6th Panhellenic Chemical Engineering Conference, Athens, Greece, May 2007.
66. A. Ovsianikov, M. Farsari, **M. Vamvakaki**, B. N. Chichkov, C. Fotakis, "Towards the microstructuring of nonlinear and hybrid polymeric materials by two-photon polymerization" SPIE Optics and Photonics, San Diego, California, USA, 26 - 30 August 2007.
67. M. Farsari, **M. Vamvakaki**, C. Fotakis, Ovsianikov, B. N. Chichkov, "3D nonlinear photonic crystals made by 2-photon polymerization" COLA 2007, 9th International Conference on Laser Ablation, Tenerife, Spain, September 24-28, 2007.
68. D. S. Achilleos, **M. Vamvakaki**, "Synthesis of Polymer Brushes onto Inorganic Nanoparticles" XXIII Panhellenic Conference of Solid State Physics and Material Science, Athens, Greece, September 2007 (**Best Poster Price**).
69. A. Mateescu, **M. Vamvakaki**, "Synthesis and Characterization of Stimuli Responsive Block Copolymer Brushes by Atom Transfer Radical Polymerization" 20th International Symposium on

- Polymer Analysis and Characterization, Agios Nikolaos, Crete, Greece, October 2007 (**Best Poster Price**).
70. D. S. Achilleos, **M. Vamvakaki**, "Polymer-Functionalized TiO₂ and ZnO nanoparticles by Atom Transfer Radical Polymerization" 20th International Symposium on Polymer Analysis and Characterization, Agios Nikolaos, Crete, Greece, October 2007.
 71. A. Mateescu, D. S. Achilleos, **M. Vamvakaki**, "Synthesis and Characterization of stimuli-responsive polymer brushes on flat and curved surfaces by ATRP" Controlled/Living Polymerization: From synthesis to applications, CLP-07, Antalya, Turkey, October 2007.
 72. M. Farsari, A. Ovsianikov, **M. Vamvakaki**, B.N. Chichkov, C. Fotakis, "Three-dimensional photonic crystals containing a nonlinear optical chromophore" 3rd International Conference on Micro-Nanoelectronics, Nanotechnology & MEMs, Micro&Nano 2007, Athens, Greece, November 2007.
 73. D. S. Achilleos and **M. Vamvakaki**, "Surface-Initiated Atom Transfer Radical Polymerization from TiO₂ and ZnO nanoparticles" Nanoparticles 2008: Synthesis, Properties and Applications of Nanoparticles, Bradford, UK, February 2008.
 74. I. Sakellari, C. Reinhardt, A. Giakoumaki, **M. Vamvakaki**, D. Gray, M. Farsari, B. N. Chichkov, and C. Fotakis, "Recent advances in the structuring of novel sol-gel composites by two-photon polymerization" E-MRS 2008 Spring Meeting, Symposium B, Strasbourg, France, May 2008.
 75. D. S. Achilleos and **M. Vamvakaki**, "Synthesis of end-grafted polymer chains from inorganic nanoparticles" General Poster Session International Fine Particle Research Institute, Annual General Meeting, Hersonissos Crete, Greece, June 2008 (**Best Poster Price**).
 76. **Maria Vamvakaki**, "Catalytic Metal Nanoparticles within Responsive Microgels" 19th Polymer Networks Group Meeting, Polymer Networks: Chemistry, Physics, Biology and Applications, Larnaca, Cyprus, June 2008 (**Invited talk**).
 77. Michael Gradzielski, **Maria Vamvakaki**, Demetris Kafouris, Costas S. Partickios, Peter Lindner, "The Structure of Amphiphilic Networks Based on Cross-linked Star Polymers: Microphase Separation Evidenced by SANS" 19th Polymer Networks Group Meeting, Polymer Networks: Chemistry, Physics, Biology and Applications, Larnaca, Cyprus, June 2008.
 78. K. E. Christodoulakis, **M. Vamvakaki**, "pH-responsive microgel particles" 1st Chemistry Graduate Student Meeting, Greece-Cyprus, Polis Chrisohous, Cyprus, July 2008.
 79. D.S. Achilleos, **M. Vamvakaki**, "Synthesis, Characterization and Optical Properties of Polymer Modified Inorganic Nanoparticles" XXIV Panhellenic Conference on Solid State Physics and Materials Science, Heraklion, Crete, September 2008.
 80. K. E. Christodoulakis, **M. Vamvakaki**, "pH-Responsive Microgel Particles" XXIV Panhellenic Conference on Solid State Physics and Materials Science, Heraklion, Crete, September 2008.
 81. V. Katsamanis, **M. Vamvakaki**, S.H. Anastasiadis "Synthesis and Characterization of Metal Nanoparticles Embedded in Block Copolymer Micelles" XXIV Panhellenic Conference on Solid State Physics and Materials Science, Heraklion, Crete, September 2008.
 82. F. K. Krasanakis, K. Chrissopoulou, **M. Vamvakaki**, "Synthesis, Characterization and Properties of Polystyrene / Layered Silicate Nanocomposites" XXIV Panhellenic Conference on Solid State Physics and Materials Science, Heraklion, Crete, September 2008.
 83. I. Sakellari, A. Giakoumaki, C. Reinhardt, A. Ovsianikov, **M. Vamvakaki**, D. Gray, B.N. Chichkov, M. Farsari, C. Fotakis "Three-dimensional photonic crystal structures made by 2-photon polymerization" XXIV Panhellenic Conference on Solid State Physics and Materials Science, Heraklion, Crete, September 2008.
 84. C. Reinhardt, A. Gaidukeviciute, N. Gaikoumaki, R. Kiyon, C. Ohrt, S. Passinger, A. Seidel, M. Farsari, **M. Vamvakaki**, B.N. Chichkov "Linear and nonlinear dielectrically loaded waveguides for guiding of surface plasmon polaritons" XXIV Panhellenic Conference on Solid State Physics and Materials Science, Heraklion, Crete, September 2008.
 85. M. Farsari, C. Reinhardt, I. Sakellari, A. Giakoumaki, A. Ovsianikov, **M. Vamvakaki**, D. Gray, B.N. Chichkov, C. Fotakis "Three-dimensional direct writing of novel sol-gel composites for photonics applications" XXIV Panhellenic Conference on Solid State Physics and Materials Science, Heraklion, Crete, September 2008.
 86. **M. Vamvakaki**, "Responsive Microgel Particles" 7th Hellenic Polymer Conference, Ioannina, September 2008.

87. E. Pavlopoulou, V. Katsamanis, K. Christodoulakis, G. Portale, W. Bras, **M. Vamvakaki**, S. H. Anastasiadis, "Impregnation of pH-Responsive Polymeric Matrices with Metal Nanoparticles" 7th Hellenic Polymer Conference, Ioannina, September 2008.
88. K. Christodoulakis, **M. Vamvakaki**, "Colloidal Microgel Particles Carrying Acidic or Basic Moieties" 7th Hellenic Polymer Conference, Ioannina, September 2008.
89. D.S. Achilleos, D. Moatsou, **M. Vamvakaki**, "End Grafted Polymer Chains onto Inorganic Nanoparticles" 7th Hellenic Polymer Conference, Ioannina, September 2008.
90. A. Mateescu, **M. Vamvakaki**, "Responsive Polymer Brushes on Flat Surfaces by Surface – Initiated Polymerization" 7th Hellenic Polymer Conference, Ioannina, September 2008.
91. A. Ranella, S. Psycharakis, V. Melissanaki, A. Giakoumaki, **M. Vamvakaki**, A. Tosca, S. Kruger-Krasagakis, M. Farsari, C. Fotakis "3-Dimensional scaffolds for tissue engineering" 1st Panhellenic Conference of research dermatology, Heraklion, Crete, October 2008.
92. D. S. Achilleos, D. Moatsou and **M. Vamvakaki** "Synthesis and characterization of polymer-functionalized inorganic nanoparticles" Synthesis and surface modification of nanocolloids, Baiona, Spain, February 2009.
93. S.H. Anastasiadis, V. Zorba, E. Stratakis, M. Barberoglou, E. Spanakis, P. Tzanetakis, C. Fotakis, A. Mateescu, **M. Vamvakaki**, "Biomimetic and responsive artificial surfaces that quantitatively reproduce the water repellency of a Lotus leaf" APS March Meeting, Pittsburgh, Pennsylvania, U.S.A., March 2009.
94. S.H. Anastasiadis, E. Stratakis, V. Zorba, M. Barberoglou, E. Spanakis, P. Tzanetakis, C. Fotakis, A. Mateescu, **M. Vamvakaki**, "Biomimetic, water repellent artificial surfaces" 7th Panhellenic Chemical Engineering Conference, Patras, Greece, June 2009.
95. D. S. Achilleos, D. Moatsou and **M. Vamvakaki**, "Synthesis of Polymer-functionalised SiO₂ Nanoparticles by Surface-initiated Atom Transfer Radical Polymerization" Frontiers in Polymer Science, Mainz, Germany, June 2009.
96. K. E. Christodoulakis and **M. Vamvakaki**, "pH-responsive Homopolymer and Polyampholyte Microgel Particles" Frontiers in Polymer Science, Mainz, Germany, June 2009.
97. E. Stratakis, M. Barberoglou, A. Pagkozidis, V. Zorba, A. Mateescu, D. S. Achilleos, **M. Vamvakaki**, S. H. Anastasiadis and C. Fotakis, "Multifunctional and responsive surfaces based on fs laser micro/nano structuring of Silicon" CLEO/IQEC 09, Baltimore, Maryland, U.S.A., May–June 2009.
98. A. Ovsianikov, B. Bhuiyan, M. Oubaha, B. D. MacCraith, M. Farsari, **M. Vamvakaki**, C. Fotakis, and B.N. Chichkov "3D Microstructuring of Hybrid Photosensitive Materials by Two-Photon Polymerization Technique for Applications in Photonics" CLEO/IQEC 09, Baltimore, Maryland, U.S.A., May–June 2009.
99. A. Gaidukeviciute, C. Reinhardt, K. Terzaki, V. Melissinaki, A. Giakoumaki, **M. Vamvakaki**, C. Fotakis, B. N. Chichkov and M. Farsari, "Fabrication of nonlinear and metallic nanostructures for plasmonic applications and metamaterials" 4th International Conference on Surface Plasmon Photonics, Amsterdam, Netherlands, June 2009.
100. A. Mateescu, J. Ye, R. Narain and **M. Vamvakaki**, "Novel Glycosurfaces by Surface-Initiated ATRP" ICMAT 2009, Singapore, June-July 2009.
101. K. Terzaki, A. Gaidukeviciute, C. Reinhardt, A. Giakoumaki, C. Fotakis, B. N. Chichkov, M. Farsari and **M. Vamvakaki**, "Hybrid and metallic nanostructures fabricated by direct laser writing" ICMAT 2009, Singapore, June-July 2009.
102. A. Mateescu, J. Ye, R. Narain and **M. Vamvakaki**, "Synthesis and characterization of glycopolymer brushes by surface-initiated ATRP" 42nd IUPAC Congress, Symposium: Soft Matter, Glasgow, UK, August 2009.
103. S. H. Anastasiadis, E. Pavlopoulou, **M. Vamvakaki**, K. Christodoulakis, "A SAXS study of the impregnation of pH-responsive polymeric microgels with metal nanoparticles" APS March Meeting, Portland, Oregon, U.S.A., March 2010.
104. A. Gaidukeviciute, C. Reinhardt, K. Terzaki, V. Melissinaki, A. Giakoumaki, **M. Vamvakaki**, M. Farsari, B. N. Chichkov, C. Fotakis, "Fabrication of 3D metallic nanostructures by two-photon polymerization for metamaterial applications" (*Invited Paper*), SPIE Photonics Europe, Brussels, Belgium, April 2010.
105. A. Gaidukeviciute, C. Reinhardt, K. Terzaki, V. Melissinaki, A. Giakoumaki, **M. Vamvakaki**, M. Farsari, B. N. Chichkov, C. Fotakis, "Fabrication of dielectrically-loaded surface plasmon

- polariton waveguide (DLSPPW) components using linear and nonlinear hybrid sol-gel materials”, SPIE Photonics Europe, Brussels, Belgium, April 2010.
106. Ioanna Sakellari, A. Gaidukeviciute, **M. Vamvakaki**, David Gray, C. Fotakis, M. Farsari, “3D photonic nanostructures fabricated using direct laser writing”, SPIE Photonics Europe, Brussels, Belgium, April 2010.
 107. M. Farsari, K. Terzaki, E. Kasotakis, A. Gaidukeviciute, V. Melissinaki, A. Ranella, C. Fotakis, **M. Vamvakaki**, A. Mitraki, “Fabrication of three-dimensional scaffolds by direct laser writing” (*Invited Paper*), SPIE Photonics Europe, Brussels, Belgium, April 2010.
 108. M. Farsari, **M. Vamvakaki**, BMM group, IESL-FORTH “Photosensitive materials for two-photon polymerization” 4th edition of the Photonics Innovation Village, SPIE Photonics Europe, Brussels, Belgium, April 2010. (**“2nd Best Innovation by an Individual Researcher” Award**)
 109. M. Bellec, D. Papazoglou, M. Kaliva, **M. Vamvakaki**, S. Tzortzakis, “Femtosecond laser patterning of linear and nonlinear optical properties in transparent media” 3rd International Symposium on Filamentation “COFIL 2010”, Crete, Greece, May-June 2010.
 110. T. K. Georgiou, M. A. Ward, P. Knight, M. D. Rikkou, **M. Vamvakaki**, E. N. Yamasaki, L. A. Phylactou, C. S. Patrickios, “Cationic Star Homo- and Co-polymers for Gene Delivery” 3rd International Symposium “Cellular Delivery of Therapeutic Macromolecules 2010”, Cardiff, UK, June 2010.
 111. L. Nikoshvili, V. Matveeva, E. Sulman, S. Anastasiadis, **M. Vamvakaki**, I. Tsvetkova, L. Bronstein, “Surface characteristics of polymer solutions as one of the aspects to understanding the polymer-containing catalyst synthesis and behaviour” XIV International Conference on Surface Forces, Moscow to St. Petersburg, Russia, June, 2010.
 112. H. S. Ginis, I. Pentari, A. Pennos, **M. Vamvakaki**, I. Pallikaris, “Post implantation adjustable Intracorneal elements” 10th Aegean Cornea Meeting, Crete, Greece, July 2010.
 113. **M. Vamvakaki**, A. Mateescu, J. Ye, R. Narain, “Synthesis and Characterization of Novel Glycosurfaces by ATRP” Macro 2010: 43rd IUPAC World Polymer Congress Glasgow, UK, July 2010.
 114. K. E. Christodoulakis and **Maria Vamvakaki**, “Amphoteric Core-Shell Microgels: Contraphilic Two Compartment Colloidal Particles” Macro 2010: 43rd IUPAC World Polymer Congress Glasgow, UK, July 2010.
 115. A. Mateescu, J. Ye, R. Narain, **M. Vamvakaki**, “Novel Glycosurfaces by Surface-Initiated ATRP” *ABSTR. PAP. AM. CHEM. S.* 451-POLY, 240th ACS National Meeting & Exposition, Boston, MA, August 2010.
 116. S. H. Anastasiadis, E. Stratakis, M. Barberoglou, V. Zorba, A. Mateescu, D. S. Achilleos, **M. Vamvakaki**, C. Fotakis, “From superhydrophobicity and water repulsion to superhydrophilicity: Smart polymer-functionalized surfaces” *ABSTR. PAP. AM. CHEM. S. ???*: 151-COLL, 240th ACS National Meeting & Exposition, Boston, MA, August 2010.
 117. K. E. Christodoulakis and **Maria Vamvakaki**, “Contraphilic Core-Shell Microgel Particles” 20th Polymer Networks Group Meeting, Goslar, Germany, August-September 2010.
 118. E. Kambouraki, M. Farsari, **M. Vamvakaki**, C. Fotakis, “Functional Hybrid Materials for Two Photon Fabrication of Semiconducting 3D Structures” PI-51, H-POL8, 8th Hellenic Polymer Society Symposium, Hersonissos, Crete, Greece, October 2010.
 119. G. Pasparakis, T. Manouras, A. Selimis, S. Psycharakis, A. Ranella, P. Argitis, **M. Vamvakaki**, “Photodegradable Polymers as Substrates for Post-Culture Cell Patterning” PI-52, H-POL8, 8th Hellenic Polymer Society Symposium, Hersonissos, Crete, Greece, October 2010.
 120. G. Pasparakis, K. Stoikos, **M. Vamvakaki**, “Synthesis and Characterization of Responsive Nanoparticles for Homogeneous Catalysis” PI-53, H-POL8, 8th Hellenic Polymer Society Symposium, Hersonissos, Crete, Greece, October 2010.
 121. D. Moatsou, D. S. Achilleos, **M. Vamvakaki**, “Bulk Homopolymerization of 2-(Dimethylamino)ethyl methacrylate via Atom Transfer Radical Polymerization” PI-54, H-POL8, 8th Hellenic Polymer Society Symposium, Hersonissos, Crete, Greece, October 2010.
 122. D. S. Achilleos, **M. Vamvakaki**, “Multiresponsive Spiropyran-Based Copolymers Synthesized by Atom Transfer Radical Polymerization” PI-55, H-POL8, 8th Hellenic Polymer Society Symposium, Hersonissos, Crete, Greece, October 2010.

123. M. Kaliva, G. E. Zervaki, A. Coustolelos, **M. Vamvakaki**, “Polymer Porphirin Nanoassemblies with Incorporated Gold Nanoparticles” PI-56, H-POL8, 8th Hellenic Polymer Society Symposium, Hersonissos, Crete, Greece, October 2010. (**Best Poster Award in Polymer Chemistry**)
124. A. Mateescu, E. Stratakis, M. Barberoglou, C. Fotakis, **M. Vamvakaki**, S. H. Anastasiadis, “Stimuli Responsive Polymer Brushes as Smart Coatings: From Superhydrophobic to Superhydrophilic Surfaces” PII-74, H-POL8, 8th Hellenic Polymer Society Symposium, Hersonissos, Crete, Greece, October 2010.
125. A. Mateescu, J. Ye, R. Narain, **M. Vamvakaki**, “Synthesis and Characterization of Novel Glycosurfaces and their Interactions with Lectins and Cells” PII-75 8th Hellenic Polymer Society Symposium, Hersonissos, Crete, Greece, October 2010.

Invited Talks

1. Stanford University, CA, USA, October 1998, “*Novel Water-Soluble Block Copolymers: Synthesis, Characterization and Evaluation*”
2. Technical University of Crete, Chania, Crete, April 2005, “*Water-Compatible, Polymeric Materials: Synthesis, Characterization and Applications*”
3. Osmangazi University, Eskisehir Turkey, May 2006, “*Responsive Polymeric Materials: Synthesis, Characterization and Applications*”
4. National Hellenic Research Foundation (NHRF), Athens, November 2006, “*Synthesis Characterization and Applications of Functional Polymers*”
5. Rice University, Houston, Texas, USA, April 2007, “*Functional Polymeric Materials: Synthesis, Characterization and Applications*”
6. University of Patras, Patras, Greece, February 2008, “*Responsive Polymeric Nanomaterials: Synthesis and Self-assembly Characteristics*”
7. Laser Zentrum Hannover e.V., Hannover, Germany, June 2009, “*Responsive Polymeric Nanomaterials for the Functionalization of Nanoparticles*”
8. Forschungszentrum, Jülich, Germany, November 2009, “*Synthesis and Responsive Properties of Functional Polymeric Materials*”
9. MIT, Boston, Massachusetts, USA, August 2010, “*Responsive Polymers as Advanced Nanomaterials*”

Scientific Highlights

1. Conference Proceedings, Faraday Discussions, 2005

One of the features of biological systems is that they operate essentially isothermally, and, more often than not isopiastically. The essential feature of the biomimetic, or, depending on how you are feeling, biokleptic, systems is that they operate in chemical potential (concentration) gradients. At this meeting the chemical potential gradient of choice was pH and the papers by the authors Vamvakaki,¹⁸ Lecommandoux⁸ and Webber¹⁹ all used $[H^+]$ to stimulate a change in molecular shape or self-organisation. We used pH to generate force in a reciprocating manner, whereas Lecommandoux⁸ and Webber¹⁹ changed the organization of the polymer with pH and ionic strength. Vamvakaki¹⁸ was the sole champion of pH changes as a processing route, using micelles to make metallic nanoparticles. It was intriguing that there were no advocates of concentration gradients of other species, Ca^{2+} comes to mind as an appropriate gradient in a biomimetic sense. But this question did emerge in the discussion.

Faraday Discuss., 2005, **128**, 421–425 **423**

2. Newspaper “Eletherotypia”, Monday 26 April 2010

Εξάγουμε νανοτεχνολογία | Άρθρα | Ελευθεροτυπία

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Έντυπη Έκδοση
Ελευθεροτυπία, Δευτέρα 26 Απριλίου 2010
ΕΠΙΤΕΥΓΜΑΤΑ ΤΟΥ Ι.Τ.Ε. ΚΡΗΤΗΣ

Εξάγουμε νανοτεχνολογία

Του ΠΑΝΑΓΙΩΤΗ ΓΕΩΡΓΟΥΔΗ

Νανο-υλικά, πρωτοποριακά παγκοσμίως, τρισδιάστατης μορφής, δημιουργεί και εξάγει μαζί με τη «συνταγή» καταργασίας τους το Ινστιτούτο Ηλεκτρονικής Δομής και Λέιζερ του Ιδρύματος Τεχνολογίας (ΙΤΕ) σε χώρες ανεπτυγμένες επιστημονικά και τεχνολογικά, όπως είναι η Ιαπωνία, η Κίνα, η Γαλλία, ο Καναδάς κ.λπ.



Η κιθάρα που κατασκεύασαν οι ερευνητές, φαίνεται μόνο με τη βοήθεια ηλεκτρονικού τηλεσκοπίου όπως και οι άλλες πολύπλοκες δημιουργίες

Μάλιστα το Εργαστήριο της Μη Γραμμικής Λιθογραφίας, που αναπτύσσει αυτά τα προϊόντα υψηλής τεχνολογίας, τελευταία δημιούργησε με τη συνεργασία επιστημονικού συνεργάτη του Πανεπιστημίου του Πειραιά νανοβαλβίδα, η οποία θα εισάγεται στο σώμα σε άτομα που πάσχουν από κυκλοφορικά προβλήματα και θα ρυθμίζει ορθολογικά την κυκλοφορία του αίματος. Τα εν λόγω υλικά, των οποίων η διάμετρος δομής τους είναι έως και χίλιες φορές μικρότερη από τη διάμετρο δομής μιας τρίχας, βραβεύτηκαν τις προηγούμενες ημέρες με το τρίτο βραβείο από το Ευρωπαϊκό «Χωριό» Καινοτομίας στις Φωτονικές Επιστήμες.

Τα υλικά

Σημειώνεται ότι η πρωτοποριακή αυτή έρευνα γίνεται χωρίς ουσιαστική υποστήριξη από το ελληνικό κράτος αφού η χρηματοδότηση της έρευνας από τη μεταπολίτευση και μετά είναι σταθερά κάτω από το 0,7% του τακτικού προϋπολογισμού, η μικρότερη στην Ευρωπαϊκή Ένωση, και ταυτόχρονα δεν υπάρχει εθνική στρατηγική για την έρευνα. Αποτέλεσμα αυτών, μεταξύ και άλλων πολλών, να είναι σχεδόν αδύνατο οι τεχνολογικές καινοτομίες να κατοχυρωθούν ως πατέντες. Ο μύθος πως η χώρα δεν παράγει τίποτα είναι καταστροφικός, ενώ πρέπει να αναδειχθεί το γεγονός πως οι επιλογές των κυβερνήσεων -οι οποίες είναι αιχμάλωτες των πελατειακών σχέσεων- είναι η μη χρηματοδότηση της έρευνας που συνεπάγεται τη μη ανταγωνιστικότητα διεθνώς.

Για τη συγκεκριμένη εργασία μιλούν στην «Ε» η επίκουρος καθηγήτρια του Τμήματος Τεχνολογίας και Επιστήμης Υλικών του Πανεπιστημίου Κρήτης και ερευνήτρια του ΙΤΕ Μαρία Βαμβακάκη, καθώς και η ερευνήτρια του ΙΤΕ Μαρία Φαρσάρη: «Φτιάχνουμε υλικά που ονομάζονται υβριδικά και τα οποία συνδυάζουν οργανικά και ανόργανα υλικά. Τα ανόργανα υλικά δίνουν τη μηχανική αντοχή στα υλικά και τα οργανικά υλικά παρέχουν τη δυνατότητα να δομησουμε με λέιζερ. Οι εφαρμογές αυτών των προϊόντων σχετίζονται με τις τηλεπικοινωνίες, τη βιοϊατρική, τις οπτο-ηλεκτρονικές εφαρμογές κ.λπ. Η ιδιαιτερότητα των δικών μας υλικών έγκειται στο γεγονός πως μπορούν να δομηθούν με τη μεγαλύτερη ανάλυση που μπορεί να γίνει παγκοσμίως. Δηλαδή μπορούμε να εγγράψουμε λεπτομέρειες δομής της ύλης σε τρεις διαστάσεις. Ταυτόχρονα, αυτά τα υλικά μπορούν να τροποποιηθούν κατάλληλα και να προσαρμοστούν στις εκάστοτε επιθυμητές εφαρμογές».

Για τον τρόπο ανάπτυξης αυτών των υλικών από το Εργαστήριο της Μη Γραμμικής Λιθογραφίας οι δύο ερευνήτριες δηλώνουν: «Αυτές οι δομές των υλικών δημιουργούνται χωρίς να επεμβαίνει ανθρώπινο χέρι. Σχεδιάζεται αρχικά στον υπολογιστή το επιθυμητό μοντέλο και αυτό ακολούθως μεταφράζεται στο εργαστήριό μας σε τρισδιάστατη δομή με τη χρήση λέιζερ. Η διάμετρος μιας δομής είναι της τάξης της διαμέτρου της μισής τρίχας, αλλά δημιουργούμε μέχρι και χίλιες φορές μικρότερη δομή από τη διάμετρο μιας τρίχας. Το Εργαστήριο της Μη Γραμμικής Λιθογραφίας όπου πραγματοποιούνται αυτές οι εφαρμογές, το στήσαμε από το μηδέν».

«Τα ερευνητικά νανο-υλικά τα εξάγουμε σε υγρή, παχύρρευστη μορφή διότι δίνει τη δυνατότητα σε ερευνητές ξένων χωρών να δημιουργήσουν τις δομές της αρεσκείας τους. Εξάγουμε τα προϊόντα αυτά από το 2008 στην Ιαπωνία, στην Κίνα, στη Λιθουανία, ενώ έχουν σταλεί στον Καναδά, στη Γαλλία, στη Φινλανδία και στη Δανία. Συγχρόνως εμείς παρέχουμε και τις συνταγές επεξεργασίας του υλικού. Δεν έχουμε όμως την οικονομική δυνατότητα να κατοχυρώσουμε την πατέντα και να διεκδικήσουμε τα αντίστοιχα οικονομικά δικαιώματα.


Οι βαλβίδες

Ενα καινούργιο δεδομένο που έχει προκύψει είναι η συνεργασία μας με τον επιστημονικό συνεργάτη από το Πανεπιστήμιο του Πειραιά, Δημήτρη Καραλέκα, όπου δημιουργούμε νανοβαλβίδες για τον έλεγχο της ροής του αίματος στις φλέβες. Αυτές οι δομές μπορούν να τοποθετηθούν μέσα στις φλέβες που έχουν κυκλοφορικό πρόβλημα και να ρυθμίζουν κατάλληλα τη ροή του αίματος, ώστε να μην υπάρχουν προβλήματα κυκλοφορίας. Όπως για παράδειγμα αυτά που εμφανίζονται εξωτερικά από το πρήξιμο των ποδιών. Η δουλειά αυτή δημοσιεύεται σε διεθνές επιστημονικό περιοδικό. Προσπαθούμε τώρα να μιμηθούμε τη φύση και να δημιουργήσουμε βιοσυμβατά υλικά, όπως δόντια και κόκαλα.

Τις προηγούμενες μέρες πήραμε μέρος στο Ευρωπαϊκό "Χωριό" Καινοτομίας στις Φωτονικές Επιστήμες, στο οποίο η δουλειά μας πήρε το τρίτο βραβείο καινοτομίας». *

3. News – Highlights, IESL-FORTH website, June 2010

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"Best Innovation by an Individual Researcher" AWARD "2nd Runner-up" European Photonics Innovation Village, Brussels 2010

ΙΤΕ εν συντομία

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Πανεπιστημιακές Εκδόσεις
Κρήτης

Αστεροσκοπείο Σκίνακα

Επιστημονικό & Τεχνολογικό
Πάρκο Κρήτης

Βραβεία ΙΤΕ

Διαλέξεις Ωνάση

Επιτροπή Ηθικής και
Δεοντολογίας ΙΤΕ

Δίκτυο ΠΡΑΞΗ

Γραφείο Διαμεσολάβησης

Νέα

↳ Επιστημονικά Νέα

↳ Θέσεις Εργασίας

↳ Δελτία Τύπου

↳ Ανακοινώσεις

↳ Προκηρύξεις - Διαγωνισμοί

Ερευνητές

Ο Δίσκος της Φαστού

Ερευνητικά Ινστιτούτα

Ινστιτούτο Ηλεκτρονικής
Δομής & ΛέιζερΙνστιτούτο Μοριακής Βιολογίας
& Βιοτεχνολογίας

Ινστιτούτο Πληροφορικής

Ινστιτούτο Υπολογιστικών
ΜαθηματικώνΙνστιτούτο Μεσογειακών
ΣπουδώνΙνστιτούτο Χημικής Μηχανικής
& Χημικών Διεργασιών Υψηλής
ΘερμοκρασίαςΙνστιτούτο Βιοϊατρικών
Ερευνών

Νέα > Δελτία Τύπου

Σημαντική επιτυχία του Εργαστηρίου Μη Γραμμικής Λιθογραφίας του
Ινστιτούτου Ηλεκτρονικής Δομής και Λέιζερ του ΙΤΕ

Απρ 30, 2010

Το Εργαστήριο Μη Γραμμικής Λιθογραφίας του Ινστιτούτου Ηλεκτρονικής Δομής και Λέιζερ κατέλαβε ανάμεσα σε 15 ερευνητικές ομάδες το τρίτο βραβείο "Best Innovation by An Individual Researcher" στο Ευρωπαϊκό «Χωριό» Καινοτομίας στις Φωτονικές Επιστήμες ("European Photonics Innovation Village") που έλαβε χώρα στις Βρυξέλλες τον Απρίλιο του 2010.

Πιο συγκεκριμένα, οι υπεύθυνες του εργαστηρίου, η ερευνητρια του ΙΤΕ και επίκουρος καθηγήτρια του Τμήματος Τεχνολογίας και Επιστήμης Υλικών του

Πανεπιστημίου Κρήτης Μαρία Βαμβακάκη, καθώς και η ερευνητρια του ΙΤΕ Μαρία Φαρσάρη, βραβεύτηκαν σχετικά με την έρευνά τους πάνω σε νανο-υλικά τρισδιάστατης μορφής των οποίων η διάμετρος δομής τους είναι έως και χίλιες φορές μικρότερη από τη διάμετρο δομής μίας τρίχας (Photosensitive materials for two-photon polymerisation)

. Πρόκειται για υβριδικά υλικά που συνδυάζουν οργανικά και ανόργανα υλικά. Τα ανόργανα υλικά δίνουν τη μηχανική αντοχή στα υλικά και τα οργανικά υλικά παρέχουν τη δυνατότητα να δομηθούν με λέιζερ.

Όπως αναφέρουν οι ίδιες οι ερευνητριες: «Οι εφαρμογές αυτών των προϊόντων σχετίζονται με τις τηλεπικοινωνίες, τη βιοϊατρική, τις οπτο-ηλεκτρονικές εφαρμογές κ.λπ. Η ιδιαιτερότητα των δικών μας υλικών έγκειται στο γεγονός πως μπορούν να δομηθούν με τη μεγαλύτερη ανάλυση που μπορεί να γίνει παγκοσμίως. Δηλαδή μπορούμε να εγγράψουμε λεπτομέρειες δόμησης της ύλης σε τρεις διαστάσεις. Ταυτόχρονα, αυτά τα υλικά μπορούν να τροποποιηθούν κατάλληλα και να προσαρμοστούν στις εκάστοτε επιθυμητές εφαρμογές».

Μάλιστα, στον τομέα της βιοϊατρικής έχει ξεκινήσει η δημιουργία νανοβαλβίδων για τον έλεγχο της ροής του αίματος στις φλέβες σε συνεργασία με τον Δημήτρη Καραλέκα, Αναπληρωτή καθηγητή και επιστημονικό συνεργάτη από το Πανεπιστήμιο Πειραιώς. Αυτές οι δομές μπορούν να τοποθετηθούν μέσα στις φλέβες που έχουν κυκλοφορικό πρόβλημα και να ρυθμίζουν κατάλληλα τη ροή του αίματος, ώστε να μην υπάρχουν προβλήματα κυκλοφορίας. Μάλιστα, η έρευνα αυτή δημοσιεύεται στο διεθνές επιστημονικό περιοδικό International Journal of Advanced Manufacturing Technology.

Οι δομές των υλικών δημιουργούνται χωρίς να επεμβαίνει ανθρώπινο χέρι. Αρχικά, το επιθυμητό μοντέλο σχεδιάζεται στον υπολογιστή και αυτό ακολούθως μεταφράζεται στο εργαστήριο σε τρισδιάστατη δομή με τη χρήση λέιζερ. Η διάμετρος μιας δομής είναι της τάξης της διαμέτρου της μισής τρίχας, ωστόσο μπορεί να δημιουργηθεί μέχρι και χίλιες φορές μικρότερη δομή από τη διάμετρο μιας τρίχας.

Αξίζει να σημειωθεί ότι τα ερευνητικά αυτά νανο-υλικά εξάγονται ήδη από το 2008 στην Ιαπωνία, στην Κίνα, στη Λιθουανία, ενώ έχουν σταλεί στον Καναδά, στη Γαλλία, στη Φινλανδία και στη Δανία. Μέσα στα άμεσα σχέδια του Εργαστηρίου Μη Γραμμικής Λιθογραφίας είναι η προσπάθεια μίμησης της φύσης και δημιουργίας βιοσυμβατών υλικών, όπως δόντια και κόκαλα.

4. *Highlights in Chemical Science, 15 June 2010 (Chemical science news from across RSC Publishing)*

Switchable superhydrophobic surfaces

<http://www.rsc.org/Publishing/ChemScience/Volume/2010/07/Switcha...>

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Switchable superhydrophobic surfaces

15 June 2010

A surface that can switch between superhydrophobic and superhydrophilic could have important medical implications, claim scientists in Greece.

Although a relatively new phenomenon, surfaces that switch between hydrophobic and hydrophilic behaviour depending on appropriate external stimuli have already gained attention due to their potential applications in microfluidic devices and cell adhesion. However, existing surfaces that respond to pH are hydrophobic at low pH and hydrophilic at high pH. This limits their use in many medical applications because at high pH the material is anionic and so does not allow interaction with other anionic molecules, such as DNA and enzymes.

Now, Spiros Anastasiadis and his team at the Institute of Electronic Structure and Laser, Crete, have successfully created a surface that is not only highly superhydrophobic and hydrophilic, but also demonstrates the opposite behaviour to currently known surfaces. They achieved this by grafting a pH responsive polymer (PDPAEMA) to a dual-scale roughened substrate and, in doing so, have also shown the importance of the substrate in creating excellent superhydrophobic surfaces.



The surface switches between superhydrophobic and superhydrophilic on changing pH

Critically, this superhydrophilic surface can interact with important anionic biological molecules in the hydrophilic state, potentially opening up new applications. 'One thing you would like to do is have a surface that can absorb DNA or enzymes and then, under different conditions, release this material,' explains Spiros. 'In our case, when it is positively charged, it is hydrophilic, so it can interact with negatively charged molecules, like DNA. When it is not charged, it is hydrophobic.'

Susan Perkin, an expert in surface chemistry at University College London, UK, recognises the potential for medical uses, but is particularly enthusiastic about the contact angles of the surface, saying that 'this is an example of a very dramatic change in the wetting behaviour just by changing the pH.'

Following this work, the authors are looking to optimise the polymer used and to make surfaces that are either superhydrophilic or superhydrophobic depending on the wavelength of light used to illuminate it.

Yuandi Li

LINK TO JOURNAL ARTICLE:

[From superhydrophobicity and water repellency to superhydrophilicity: smart polymer functionalized surfaces](#)

Emmanuel Stratakis, Anca Mateescu, Marios Barberoglou, Maria Vamvakaki, Costas Fotakis and Spiros H. Anastasiadis, *Chem. Commun.*, 2010, **46**, 4136-4138. DOI: [10.1039/c003294h](https://doi.org/10.1039/c003294h)

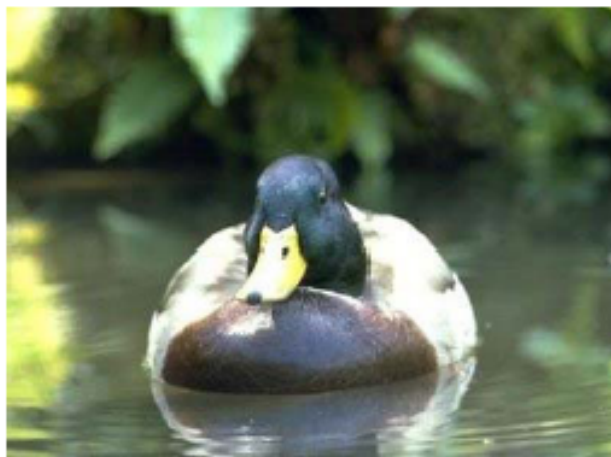
Water Off a Duck's Back

Author: David Bradley

Published: 25 June 2010

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Surfaces and materials which are able to reversibly switch their hydrophobicity/hydrophilicity in response to external stimuli such as changes in pH, have a wide variety of potential applications.

Researchers lead by Spiros Anastasiadis, University of Crete, Greece, have grafted a pH-responsive material, PDPAEMA, on to a substrate, which could be used in microelectromechanical systems (MEMS) and lab-on-a-chip devices. The material can be switched between being highly water repellent to superhydrophobic but does so with the opposite character to previously developed materials. At high pH the new material is superhydrophilic.

This property will allow microfluidics devices that exploit the behavior to be used with cells, proteins and nucleic acids, which undergo unwanted interactions at high pH with hydrophilic materials.

[From superhydrophobicity and water repellency to superhydrophilicity: smart polymer-functionalized surfaces](#)

E. Stratakis, A. Mateescu, M. Barberoglou, M. Vamvakaki, C. Fotakis, S. H. Anastasiadis, *Chem. Commun.* 2010, 46, 4136.

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> MICROFLUIDICS Jun 16th, 2010

Switchable superhydrophobic surfaces

A surface that can switch between superhydrophobic and superhydrophilic could have important medical implications, claim scientists in Greece.

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Although a relatively new phenomenon, surfaces that switch between hydrophobic and hydrophilic behaviour depending on appropriate external stimuli have already gained attention due to their potential applications in microfluidic devices and cell adhesion. However, existing surfaces that respond to pH are hydrophobic at low pH and hydrophilic at high pH. This limits their use in many medical applications because at high pH the material is anionic and so does not allow interaction with other anionic molecules, such as DNA and enzymes.

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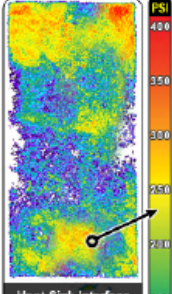


The surface switches between superhydrophobic and superhydrophilic on changing pH

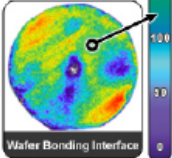
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pH RESPONSIVE SURFACES THAT SWITCH FROM SUPERHYDROPHILIC TO SUPERHYDROPHOBIC

Scientists have tried to mimic the superhydrophobic nature of lotus leaves for a long time now. This has led to the development of self-cleaning coatings and water-repellent surfaces which are being used for various purposes. Now, researchers at the Foundation for Research and Technology – Hellas and the University of Crete in Greece have gone one step ahead and created surfaces that switch from superhydrophilic to superhydrophobic and water repellent on varying the pH of the solution.

Researchers prepared this surface by synthesizing a pH-sensitive and sufficiently hydrophobic polymer poly 2-(diisopropylamino) ethyl methacrylate (PDPAEMA) onto a silicon based substrate. The silicon substrate was treated with ultra fast lasers to obtain the hierarchical micro/nano structured roughness required to amplify the switchable hydrophilicity / hydrophobicity and water repellence. The polymer utilized allows the development of surfaces which are cationic and superhydrophilic at low pH and neutral; and superhydrophobic and water repellent at high pH.

The variable behavior of the surface is attributed to the pH responsive characteristic of the polymer and the dual scale roughness property of the coated substrate. Researchers claim that this unique nature of the material can find applications in microfluidics, biotechnology, sensors and as self-cleaning surfaces.

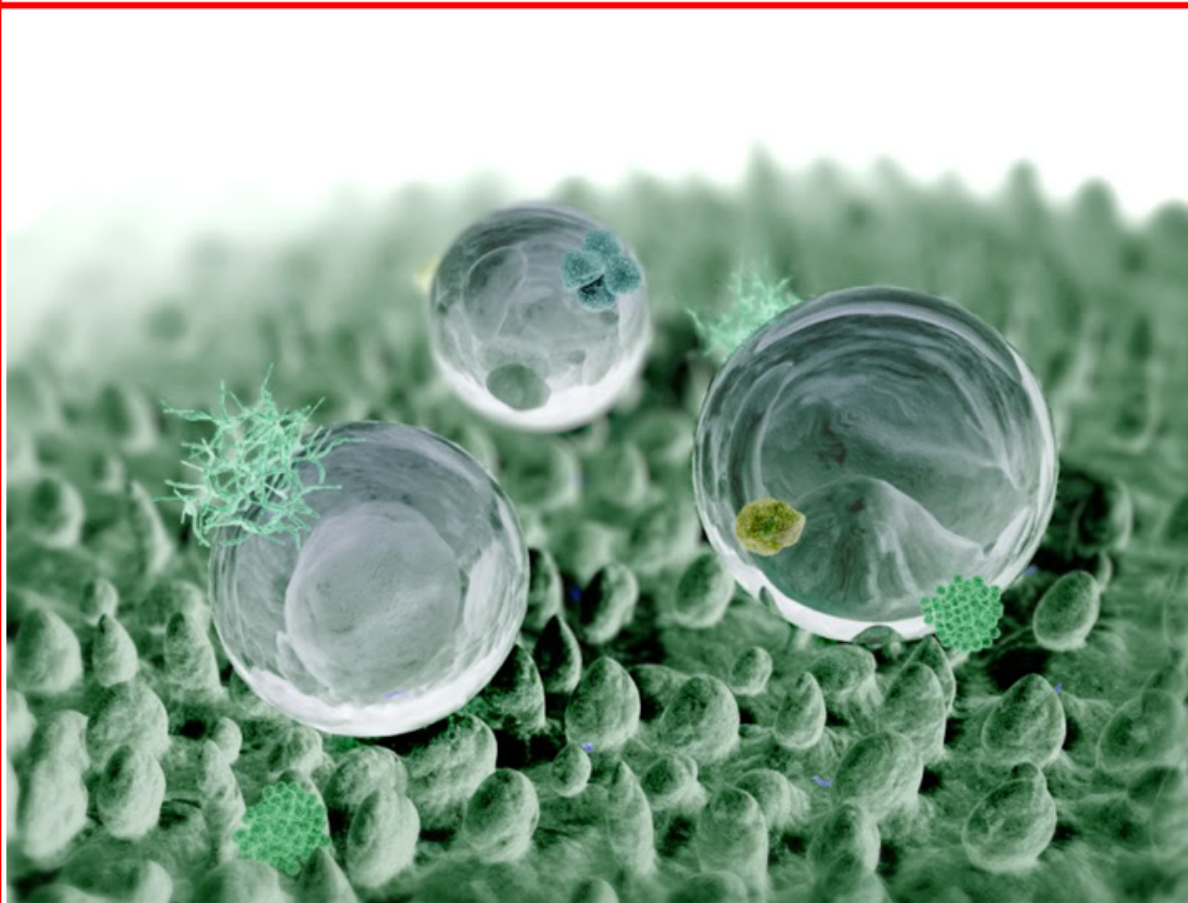
Presently, switchable surfaces that are superhydrophobic at low pH and anionic and superhydrophilic at high pH have been reported. However, these surfaces cannot react with enzymes, DNA and drugs as opposed to the ones prepared by the Greek researchers. They say that the ability of PDPAEMA surfaces to react with biologically active compounds can make them useful in drug delivery, bio separation, biosensors, enzyme immobilization and so on. They add that with these surfaces, DNA molecules could be separated which could be utilized in micro-lab-on-a-chip devices.

The research is at the development stage and work is going on to improve the water repellency and hydrophilic characteristics of these PDPAEMA-coated surfaces. In addition to this, researchers are trying to make them respond to other stimuli like light, temperature, humidity and so on. They are also exploring the possibility of employing flexible plastic substrates. The rare nature of these switchable surfaces could open opportunities for further investigations regarding more potential applications. The year of impact of this technology is after 2015. Biomedical devices, optofluidics and biotechnology are some of the sectors that could get influenced by this technology.

Details: Prof. Spiros Anastasiadis, Chemistry Institute of Electronic Structure and Laser, Foundation for Research & Technology, Hellas, 71110 Heraklion, Crete, Greece Ph: +30-2810-391466 Fax: +30-2810-391305 E-mail: spiros@iesl.forth.gr

MIÉRCOLES 16 DE JUNIO DE 2010

Polímeros inteligentes: de superhidrofóbicos a superhidrofilicos.



Una superficie como la de la imagen se denomina superhidrofóbica, vemos cómo las gotas de agua son esferas casi perfectas. Una superficie en la que no hubiese gotas porque éstas se extienden rápidamente sería superhidrofilica. Pues bien, existen superficies que pueden pasar de ser superhidrofóbicas a superhidrofilicas por un estímulo externo. Y tienen aplicaciones médicas.

Aunque este es un fenómeno relativamente nuevo, las superficies que cambian su comportamiento de hidrofóbico a hidrofílico dependiendo de un estímulo externo apropiado han encontrado aplicación rápidamente en los dispositivos de microfluidos y en la adhesión de células. Sin embargo las superficies que existen hasta la fecha responden a cambios de pH: son hidrofóbicas a pH bajo (ácido) e hidrofílicas a pH alto (básico). Esto limita su uso en muchas aplicaciones médicas porque a alto pH el material es aniónico y no puede interactuar con otras moléculas aniónicas como las enzimas o el propio ADN.

Ahora, el equipo de Spiros Anastasiadis, de la Universidad de Creta (Grecia), publica en *Chemical Communications* que ha conseguido crear una superficie que no sólo es muy superhidrofóbica (véase [vídeo 1](#)) y puede cambiar a superhidrofilica (véase [vídeo 2](#)), sino que también presenta el comportamiento opuesto al resto de las superficies conocidas hasta ahora. Lo han conseguido injertando un polímero que responde al pH (el poli (2-diisopropilamino) etil metacrilato; PDPAEMA) en un sustrato rugoso a doble escala (micro y nano) que quiere imitar la superficie del loto (*Nelumbo nucifera*) [en la imagen], que aporta unas excelentes características hidrofóbicas.

Lo más interesante es que la superficie hidrofílica (cargada positivamente) puede interactuar con importantes biomoléculas aniónicas, lo que abre todo un abanico de nuevas aplicaciones. Podemos imaginar una superficie que, en determinadas condiciones, adsorba enzimas o ADN y en otras condiciones diferentes los libere. El siguiente paso será que la superficie responda a estímulos físicos y no químicos, como la longitud de onda de la luz incidente, por ejemplo.

Referencia:

Stratakis, E., Mateescu, A., Barberoglou, M., Vamvakaki, M., Fotakis, C., & Anastasiadis, S. (2010). From superhydrophobicity and water repellency to superhydrophilicity: smart polymer-functionalized surfaces *Chemical Communications*, 46 (23) DOI: 10.1039/c003294h

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