Dorothea Helmer

Personal Details

Address	Rebstuhlweg 27, 79232 March +49 (0) 7665/4248481
Contact	IMTEK, Department of Microsystems Engineering Georges-Köhler-Allee 103 79110 Freiburg im Breisgau +49 (0)761 203 7353 dorothea.helmer@imtek.uni-freiburg.de
Birth/Location	22.04.1986/Rastatt (Germany)

Professional Experience

- 17 ISI referenced papers, 4 first-author, 2 papers under revision
- 14 presentations at international conferences
- 1 book chapter
- 4 patents (pending)
- Co-Founder Glassomer GmbH, nanocomposites for microstructuring of fused silica glass

since 10/2014	**Postdoc** at the NeptunLab of Bastian E. Rapp
2009 - 2014	**PhD thesis**, Dr. rer. nat. final grade: 1.0, organic chemistry and biochemistry, "Synthesis and Test of Peptides and Peptoids for the Inhibition of Cytokines", Prof. Katja Schmitz Technical University of Darmstadt
2004 - 2009	**Studies** in chemistry, University of Karlsruhe, final grade: 1.2

Research Interests

- New materials and compositions: Towards enabling techniques for in-lab fabrication of prototypes [1, 4, 5, 6]
- Engineered surfaces I: Surface functionalization chemistry for tuning surface wettability – towards super-repellent and functional surfaces [2]
- Engineered surfaces II: Surface functionalization chemistry for selective attachment of molecules – toward simple designs for analytical devices in e.g. paperbased microfluidics [3, 8]
- 3D printing and technology development: towards novel techniques for 3D fabrication [7]
- Microfluidics and flow phenomena: towards understanding the behaviour of liquids in contact with solids [9]
- Screening and image analysis methods [10]

Experience

- Organic Chemistry and Biochemistry: Diploma on Nanoparticle Separation Techniques of proteins, PhD on Interleukin-8 Inhibitors. Experienced in organic synthesis in solution and on solid phase, analytical techniques: nuclear magnetic resonance spectroscopy NMR, high-pressure liquid chromatography HPLC, thin layer chromatography TLC, mass spectrometry MS, Infrared Spectroscopy FTIR
- Polymer Chemistry: Experienced in polymerization techniques in solution and in bulk, coating techniques and polymer analysis
- Analytical Techniques for surface characterization: scanning electron microscopy SEM, energy dispersive x-ray spectroscopy EDX, white light interferometry WLI, atomic force microscopy AFM, X-ray photoelectron spectroscopy XPS
- Material characterization: Contact angle and surface energy, Vickers hardness, scratch resistance, viscosity, friction coefficient
- Microbiology: Experienced in S1 and S2 laboratory work and antibiotic resistance: plating, minimum inhibitory concentration assay MIC, viability analysis
- Programming of G-codes for machine operation

10 Most Important Publications

[1] F. Kotz, K. Arnold, W. Bauer, D. Schild, N. Keller, K. Sachsenheimer, T. M. Nargang, C. Richter, **D. Helmer**, B. E. Rapp: "Three-dimensional Printing of Transparent Fused Silica Glass", Nature, 544, 337-339, 2017.

[2] **D. Helmer**, N. Keller, F. Kotz, F. Stolz, C. Greiner, T. M. Nargang, K. Sachsenheimer, B. E. Rapp: „Transparent, abrasion-insensitive superhydrophobic coatings for real-world applications", Scientific Reports, 7, 1, 15078, 2017.

[3] T. M. Nargang, M. Runck, **D. Helmer**, B. E. Rapp: "Functionalization of paper using photobleaching: a fast and convenient method for creating paper-based assays with colorimetric and fluorescent readout", Engineering in Life Sciences, 16, 525-531, 2016.

[4] F. Kotz, N. Schneider, A. Striegel, A. Wolfschläger, N. Keller, M. Worgull, W. Bauer, D. Schild, M. Milich, C. Greiner, **D. Helmer**, B. E. Rapp: "Glassomer: Processing Fused Silica Glass like a Polymer", Advanced Materials, 30, 1707100, 2018.

[5] F. Kotz, P. Risch, **D. Helmer**, B. E. Rapp: "Highly Fluorinated Methacrylates for Optical 3D Printing of Microfluidic Devices", Micromachines, 9, 115, 2018 (invited).

[6] F. Kotz, K. Arnold, S. Wagner, W. Bauer, N. Keller, T. M. Nargang, **D. Helmer**, B. E. Rapp: "Liquid PMMA: A High Resolution Polymethylmethacrylate Negative Photoresist as Enabling Material for Direct Printing of Microfluidic Chips", Advanced Engineering Materials, 20, 1700699, 2017.

[7] **D. Helmer**, A. Voigt, S. Wagner, N. Keller, K. Sachsenheimer, F. Kotz, T. M. Nargang, B. E. Rapp: "Suspended Liquid Subtractive Lithography: One-step generation of 3D channel geometries in viscous curable polymer matrices", Scientific Reports 7, 7387, 2017.

[8] T. M. Nargang, R. Dierkes, J. Bruchmann, N. Keller, K. Sachsenheimer, C. Lee-Thedieck, F. Kotz, **D. Helmer** and B. E. Rapp: "Photolithographic structuring of soft, extremely foldable and autoclavable hydrophobic barriers in paper", Analytical Methods, 10, 4028-4035, 2018.

[9] C. Richter, F. Kotz, S. Giselbrecht, **D. Helmer**, B. E. Rapp: "Numerics made easy: solving the Navier–Stokes equation for arbitrary channel cross-sections using Microsoft Excel", Biomedical Microdevices 18:52, 2016.

[10] **D. Helmer**, K. Brahm, C. Helmer, J. S. Wack, G. Brenner-Weiss, K. Schmitz: "Two-channel image analysis method for the screening of OBOC libraries", Analytical Methods, 8, 4142-4152, 2016.

Prices

- SPIE photonics west startup challenge finalist 2018
- Science Slammer, University of Freiburg 2011, Karlsruhe SWR Fernsehen "Wissenschaft mal anders" 2011, Darmstadt at Merck 2013
- Science Slam for the inauguration of the "Lichtwiesenzentrum", TU Darmstadt 2013
- Winner of FameLab Baden Württemberg 2012