

DR. RER. NAT. THOMAS SCHMID
DIPLOM-CHEMIKER UNIV. (TUM)
SENIOR RESEARCH ASSOCIATE / LECTURER (ETH ZURICH)

Born 02 July 1974 in Bozen (Bolzano), Südtirol/Italy
Citizenship: Italian
Legal Status: Single
Languages: German, Italian, English



Office Address:

Department of Chemistry and Applied Biosciences
ETH Zurich
Wolfgang-Pauli-Str. 10, HCI D323
8093 Zurich
Switzerland

Phone: (+41) 044-6326112

Fax: (+41) 044-6321292

E-mail: schmid@org.chem.ethz.ch

Current Research Interests:

- Imaging and chemical analysis with nanometer-scale resolution
- Investigation of biological systems
- AFM, Raman, near-field microscopy

CURRICULUM VITAE

1980-1988	Elementary and Secondary school in Bozen (Bolzano), Italy
1988-1993	High school in Auer (Ora), Italy
1993	High school graduation / Matura („Maturità Tecnica di Perito Agrario“)
1993-1999	Study of Chemistry at the Technical University Munich
1999	Diploma thesis: 'Depth-resolved Analysis of Biofilms by Photoacoustic Spectroscopy', Institute of Hydrochemistry (Univ.-Prof. Dr. Reinhard Niessner), Technical University Munich
1999	Diploma (Dipl.-Chem. Univ.) at the Technical University Munich, grade: 'mit Auszeichnung (summa cum laude)'
1999-2003	PhD student at the Institute of Hydrochemistry (Prof. Dr. R. Niessner, PD Dr. U. Panne), Technical University Munich PhD thesis: 'Laser-induced Photoacoustic Spectroscopy as a Sensor Principle: Applications in Process and Environmental Analysis', grade: 'mit Auszeichnung (summa cum laude)'
2004-2005	Postdoctoral fellow at the Institute of Hydrochemistry, Technical University Munich
2005-2007	Postdoctoral fellow at ETH Zurich, Department of Chemistry and Applied Biosciences, Analytical Chemistry Group, Prof. Dr. R. Zenobi
2007-	Senior research associate (Oberassistent) / Lecturer at ETH Zurich, Department of Chemistry and Applied Biosciences, Analytical Chemistry Group, Prof. Dr. R. Zenobi

TEACHING APPOINTMENTS

2006-	'Instrumentalanalyse Organischer Verbindungen' 26 hours, ETH Zurich, spring semester Interpretation of IR, MS, and NMR spectra of organic compounds Class for students of Chemistry (BSc), Biochemistry (BSc), and Interdisciplinary Sciences (BSc)
2009-	'Analytische Chemie (für Biol./Pharm.Wiss.)' 13 hours, ETH Zurich, fall semester Topics: chromatography, electrophoresis, sample preparation Analytical Chemistry lecture for students of Biology (BSc) and Pharmaceutical Sciences (BSc)
2010	'Analytische Chemie I' 8 hours, ETH Zurich, fall semester Topics: UV/VIS, IR, ORD, and CD spectroscopy Analytical Chemistry lecture for students of Chemistry (BSc), Biochemistry (BSc), Chemical Engineering (BSc), Interdisciplinary Sciences (BSc), Materials Sciences (BSc), Environmental Sciences (BSc), and Biotechnology (BSc)

SCHOLARSHIPS ETC.

2001-2003	Scholarship awarded by Max-Buchner-Forschungsstiftung
2005-2007	Scholarship awarded by Deutsche Forschungsgemeinschaft

Poster awards and travel grants / invited talks: see Oral and Poster Presentations.

MEMBERSHIPS

Swiss Chemical Society (SCS)

- Division of Analytical Chemistry

German Chemical Society / Gesellschaft Deutscher Chemiker (GDCh)

- German Hydrochemical Society
- Division of Analytical Chemistry

German Physical Society / Deutsche Physikalische Gesellschaft (DPG)

REFEREE

Ad hoc referee for the following journals:

Analytical Chemistry

Analytical and Bioanalytical Chemistry

Applied Spectroscopy

Chemical Communications

Journal of Biophotonics

Journal of Photochemistry

Journal of Physical Chemistry

Optics Express

Optics Letters

Physica Status Solidi

PUBLICATIONS

* These authors contributed equally to a publication.

C. Blum, T. Schmid*, L. Opilik*, R.M. Balabin, R. Zenobi (2011). Understanding Tip-enhanced Raman Spectra: A Combined Raman, SERS and TERS Study, submitted.

R.M. Balabin, T. Schmid, R.Z. Syunyaev, R. Zenobi (2011). Physical Chemistry of Acridine Adsorption onto Gold Surface: the Influence of Nanostructure as Revealed by Near-Infrared and Tip-enhanced Raman Spectroscopy (TERS). *Proc. SPIE* **8098**:80980Q.

J. Stadler, T. Schmid, R. Zenobi (2011). Developments in and Practical Guidelines for Tip-Enhanced Raman Spectroscopy, *Nanoscale*, accepted.

J. Stadler, T. Schmid, R. Zenobi (2011). Nanoscale Chemical Imaging of Graphene, *ACS Nano*, in press DOI: 10.1021/nn2035523. Featured in *Chemical and Engineering News* (2011) **89**(42) 14 Oct 2011.

T. Schmid*, M. Pacton*, J. Stadler, G. Gorin, M. Massault (2011). Unravelling the Origin of Oceanic Anoxic Event 1b in Central Italy from the Metabolism of Cretaceous Bacteria, submitted.

J. Stadler, T. Schmid, L. Opilik, P. Kuhn, P. S. Dittrich, R. Zenobi (2011). Tip-enhanced Raman spectroscopic imaging of patterned thiol monolayers. *Beilstein J. Nanotechnol.* **2**:509–515.

J. Stadler, T. Schmid, R. Zenobi (2011). Chemical Imaging on the Nanoscale – Top-Illumination Tip-Enhanced Raman Spectroscopy. *Chimia* **65**:235–239.

D. Abou-Ras, R. Caballero, C.-H. Fischer, C. Kaufmann, I. Lauermann, R. Mainz, H. Mönig, A. Schöpke, C. Stephan, C. Streeck, S. Schorr, A. Eicke, M. Doebeli, B. Gade, J. Hinrichs, T. Nunney, H. Dijkstra, V. Hoffmann, D. Klemm, V. Efimova, A. Bergmaier, G. Dollinger, T. Wirth, W. Unger, A. Rockett, A. Perez-Rodriguez, J. Alvarez Garcia, V. Izquierdo-Roca, T. Schmid, P.-P. Choi, M. Müller, F. Bertram, J. Christen, H. Khatri, R. Collins, S. Marsillac, I. Kötschau (2011). Comprehensive comparison of various techniques for the analysis of elemental distributions in thin films, *Microsc. Microanal.* **17**:728–751.

L. Opilik, T. Schmid*, T. Bauer*, J. Stadler, R. Zenobi (2011). Nanoscale Chemical Imaging of Segregated Lipid Domains using Tip-Enhanced Raman Spectroscopy. *Phys. Chem. Chem. Phys.* **13**:9978–9981.

T. Schmid*, P.L. Urban*, A. Amantonico*, R. Zenobi (2011). Multidimensional Analysis of Single Algal Cells by Integrating Microspectroscopy with Mass Spectrometry. *Anal. Chem.* **83**:1843–1849.

R.M. Balabin, R.Z. Syunyaev, T. Schmid, J. Stadler, E.I. Lomakina, R. Zenobi (2011). Asphaltene Adsorption Onto an Iron Surface: Combined Near Infrared (NIR), Raman, and AFM Study of the Kinetics, Thermodynamics, and Layer Structure. *Energ. Fuel.* **25**:189–196.

J. Stadler, T. Schmid, R. Zenobi (2010). Nanoscale Chemical Imaging Using Top-Illumination Tip-Enhanced Raman Spectroscopy. *Nano Lett.* **10**:4514–4520.

P.L. Urban, K. Jefimovs, A. Amantonico, S.R. Fagerer, T. Schmid, S. Mädler, J. Puigmarti-Luis, N. Goedecke, R. Zenobi (2010). High-density micro-arrays for mass spectrometry. *Lab. Chip* **10**:3206–3209.

T. Schmid (2010). Nanoscale Chemical Analysis Using Tip-Enhanced Raman Spectroscopy (TERS) and Tip-Enhanced Fluorescence (TEF), in: P. Sevilla Sierra (ed.) *Plasmónica: Detección sobre*

nanoestructuras metálicas, pp. 231-264, Comité de Espectroscopía, Sociedad Española de Optica, ISBN 9788469321836.

T Schmid, A. Sebesta, J. Stadler, L. Opilik, R. M. Balabin, R. Zenobi (2010). Tip-Enhanced Raman Spectroscopy and Related Techniques in Studies of Biological Materials. *Proc. SPIE* **7586**:758603.

W. Zhang, H. Fischer, T. Schmid, R. Zenobi, O. Martin (2009). Mode-Selective Surface-Enhanced Raman Spectroscopy Using Nanofabricated Plasmonic Dipole Antennas. *J. Phys. Chem. C* **113**:14672-14675.

T. Schmid*, B.S. Yeo*, G. Leong, J. Stadler, R. Zenobi (2009). Performing Tip-Enhanced Raman Spectroscopy in Liquids. *J. Raman Spectrosc.* **40**:1392-1399.

T. Schmid, J. Stadler, R. Zenobi (2009). Chemische Analytik auf der Nanometerskala: Kombinationen aus Rasterkraftmikroskopie und Ramanspektroskopie. *Analytik News*, Fachartikel, <http://www.analytik-news.de/Fachartikel/2009/43.html>.

B.S. Yeo, J. Stadler, T. Schmid, R. Zenobi (2009). Tip-Enhanced Raman Spectroscopy – Its Status, Challenges and Future Directions. *Chem. Phys. Lett.* **472**:1-13. **Cover paper.**

T. Schmid, U. Panne, R. Niessner, C. Haisch (2009). Optical Absorption Measurements of Opaque Liquid Samples by Pulsed Laser Photoacoustic Spectroscopy. *Anal. Chem.* **81**:2403-2409.

T. Schmid (2009). NFO 10: Tenth International Conference on Near-Field Optics, Nanophotonics and Related Techniques (Conference Highlights). *Anal. Bioanal. Chem.* **393**:411-413.

B.S. Yeo, E. Amstadt, T. Schmid, J. Stadler, R. Zenobi (2009). Nanoscale Probing of a Polymer Blend Thin Film with Tip-Enhanced Raman Spectroscopy. *Small* **5**:952–960.

T. Schmid*, B.S. Yeo*, W. Zhang, R. Zenobi (2009). Spectroscopic Imaging with Nanometer Resolution Using Near-Field Methods, in: R. Salzer, H.W. Siesler (eds.) *Infrared and Raman Spectroscopic Imaging*, pp. 473-499, Wiley-VCH, ISBN 9783527319930.

T. Schmid, C. Camus, S. Lehmann, D. Abou-Ras, C.-H. Fischer, M.C. Lux-Steiner, R. Zenobi (2009). Spatially Resolved Characterization of Chemical Species and Crystal Structures in CuInS₂ and CuGa_xSe_y Thin Films Using Raman Microscopy. *Phys. Stat. Sol. A*, **206**:1013–1016.

M. Sánchez-Román, C. Vasconcelos, T. Schmid, J.A. McKenzie, M. Dittrich, R. Zenobi, M.A. Rivadeneyra (2008). Aerobic Microbial Dolomite at the Nanometer Scale: Implications for the Geologic Record. *Geology* **36**:879-882.

T. Schmid, J. Burkhard, B.S. Yeo, W. Zhang, R. Zenobi (2008). Towards Chemical Analysis of Nanostructures in Biofilms I. Imaging of Biological Nanostructures. *Anal. Bioanal. Chem.* **391**:1899-1905. **Cover paper.**

T. Schmid, A. Messmer, B.S. Yeo, W. Zhang, R. Zenobi (2008). Towards Chemical Analysis of Nanostructures in Biofilms II. Tip-enhanced Raman Spectroscopy of Alginates. *Anal. Bioanal. Chem.* **391**:1907-1916. **Cover paper.**

B.S. Yeo, T. Schmid, W. Zhang, R. Zenobi (2008). A Strategy to Prevent Signal Losses, Analyte Decomposition, and Fluctuating Carbon Contamination Bands in Surface-Enhanced Raman Spectroscopy. *Appl. Spectrosc.* **62**:708-713.

- B.S. Yeo, S. Mädler, T. Schmid, W. Zhang, R. Zenobi (2008). Tip-Enhanced Raman Spectroscopy Can See More: The Case of Cytochrome c. *J. Phys. Chem. C* **112**: 4867-4873
- W. Zhang, T. Schmid, B.S. Yeo, R. Zenobi (2008). Near-Field Heating, Annealing and Signal Loss in Tip-Enhanced Raman Spectroscopy. *J. Phys. Chem. C* **112**:2104-2108.
- W. Zhang, X. Cui, B.S. Yeo, T. Schmid, C. Hafner, R. Zenobi (2007). Nanoscale Roughness on Metal Surfaces Can Increase Tip-Enhanced Raman Scattering by an Order of Magnitude. *Nano Lett.* **7**:1401-1405.
- W. Zhang, T. Schmid, B.S. Yeo, R. Zenobi (2007). Tip-enhanced Raman Spectroscopy Reveals Rich Nanoscale Adsorption Chemistry of 2-Mercaptopyridine on Ag. *Israel J. Chem.* **47**:177-184.
- B.S. Yeo, T. Schmid, W. Zhang, R. Zenobi (2007). Towards Rapid Nanoscale Chemical Analysis Using Tip-enhanced Raman Spectroscopy with Ag-coated Dielectric Tips. *Anal. Bioanal. Chem.* **387**:2655-2662.
- W. Zhang, B.S. Yeo, T. Schmid, R. Zenobi (2007). Single Molecule Tip-Enhanced Raman Spectroscopy with Silver Tips. *J. Phys. Chem. C* **111**:1733-1738. Featured in *Neue Zürcher Zeitung* 06 Feb 2007.
- T. Schmid, T.A. Schmitz, P.D. Setz, B.S. Yeo, W. Zhang, R. Zenobi (2006). Methods for Molecular Nanoanalysis. *Chimia* **60**:783-788.
- T. Schmid, B.S. Yeo, W. Zhang, R. Zenobi (2006). Use of Tip-enhanced Vibrational Spectroscopy for Analytical Applications in Chemistry, Biology and Materials Science, in: S. Kawata, V.M. Shalaev (eds.) *Tip Enhancement*, pp. 115-155. Elsevier. ISBN 0444520589.
- T. Schmid (2006). Photoacoustic Spectroscopy for Process Analysis. *Analytical and Bioanalytical Chemistry* **384**:1071-1086. **Invited review.**
- T. Schmid, U. Panne, J. Adams, R. Niessner (2004). Investigation of Biocide Efficacy by Photoacoustic Biofilm Monitoring. *Water Research* **38**:1189-1196. Featured in *Chemische Rundschau* (2003) **17**(Sep):54-55.
- C. Haisch, T. Schmid, R. Niessner (2003). Vom Spektrophon zur OA-Tomographie. *CLB – Chemie in Labor und Biotechnik* **54**:408-413.
- U. Schloßer, E. Schollmeyer, T. Schmid, C. Helmbrecht, C. Haisch, R. Nießner (2003). Photoakustische Spektroskopie an wasserlöslichen Färbeflotten. *Melliand Textilberichte* **9**:759-761.
- T. Schmid, U. Panne, C. Haisch, R. Niessner (2003). Biofilm Monitoring by Photoacoustic Spectroscopy (PAS). *Water Science and Technology* **47**:25-29.
- T. Schmid, C. Helmbrecht, C. Haisch, U. Panne, R. Niessner (2003). On-line Monitoring of Opaque Liquids by Photoacoustic Spectroscopy. *Analytical and Bioanalytical Chemistry* **375**:1130-1135.
- T. Schmid, C. Helmbrecht, U. Panne, C. Haisch, R. Niessner (2003). Process Analysis of Biofilms by Photoacoustic Spectroscopy. *Analytical and Bioanalytical Chemistry* **375**:1124-1129.
- T. Schmid, U. Panne, C. Haisch, R. Niessner (2003). Biofilm Monitoring by Photoacoustic Spectroscopy, in: V. O'Flaherty, P. Lens, T. Mahony, A. Moran, P. Stoodley (eds.) *Biofilms in Medicine, Industry and Environmental Biotechnology: Characteristics, Analysis and Control*, pp. 443-449. IWA Publishing, London. ISBN 1843390191. **Invited book chapter.**

T. Schmid, U. Panne, C. Haisch, R. Niessner (2003). Photoacoustic Absorption Spectra of Biofilms. *Review of Scientific Instruments* **74**:755-757.

T. Schmid, U. Panne, C. Haisch, M. Hausner, R. Niessner (2002). A Photoacoustic Technique for In Situ Monitoring of Biofilms. *Environmental Science and Technology* **36**:4135-4141. Featured in *Anal. Chem.* (2002) **74**:559 A.

T. Schmid (2001). Den biologischen Rasen wachsen hören – Photoakustische Spektroskopie an Biofilmen / Photoacoustic Spectroscopy on Biofilms. *Process* **9**:80-82.

T. Schmid, L. Kazarian, U. Panne, R. Niessner (2001). Depth-Resolved Analysis of Biofilms by Photoacoustic Spectroscopy. *Analytical Sciences* **17** (Special Issue):574–577.

T. Schmid (2000). Zerstörungsfreie Analysenmethoden zur Bestimmung der Inhaltsstoffe beim Obst. *Obstbau Weinbau* **37(3)**:79-80.

PHD THESIS

T. Schmid (2003). *Laserinduzierte photoakustische Spektroskope als Sensorprinzip: Anwendungen in der Prozess- und Umweltanalytik*. Dissertation an der Technischen Universität München. Tenea-Verlag Berlin. ISBN 3865040381.

ORAL PRESENTATIONS

T. Schmid: Tip-Enhanced Raman Spectroscopy: The Chemist's "Eyes" for the Nanoworld. *1st Seminar ETH Zurich-CEA Grenoble*, 08.06.2011, Zurich, Switzerland.

T. Schmid, J. Stadler, L. Opilik, R. Zenobi: Tip-Enhanced Raman Spectroscopy for Nanoscale Chemical Analysis of Transparent and Opaque Samples. *NFO 11*, 29.08.-02.09.2010, Beijing, China.

T. Schmid: Tip-Enhanced Raman Spectroscopy and Related Techniques in Studies of Biological Materials. *Photonics West 2010*, 23.-28.01.2010, San Francisco, USA. **Invited Talk.**

T. Schmid: Klein, kleiner am kleinsten (oder: Alles Nano oder was?). *Nacht der Forschung 2009*, 25.09.2009, Zurich, Switzerland.

T. Schmid: Chemical Imaging Techniques for the Nanoworld. *III Workshop Nanociencia y Nanotecnología Analíticas*, 16.-18.09.2009, Oviedo, Spain. **Invited Talk.**

T. Schmid: Nanoscale Chemical Analysis of Biological Systems. *Society for General Microbiology Fall Meeting*, 07.-10.09.2009, Edinburgh, Scotland, UK. **Invited Talk.**

T. Schmid, J. Stadler, R. Zenobi: Nanoscale Imaging and Chemical Analysis Using Combinations of Atomic Force Microscopy and Raman Microspectroscopy. *SCS Fall Meeting*, 04.09.2009, Lausanne, Switzerland.

T. Schmid, B.S. Yeo, J. Stadler, R. Zenobi: Bildgebung und chemische Analytik auf der Nanometerskala mittels Kombinationen aus optischer Mikroskopie, Rastersondenmikroskopie und Ramanspektroskopie. *Anakon 2009*, 17.-20.03.2009, Berlin, Germany.

T. Schmid, R. Zenobi: Nanowelt. *Nacht der Forschung 2008*, 26.09.2009, Zurich, Switzerland.

- T. Schmid: Nanoscale Chemical Analysis. *Helmholtz Centre Berlin for Materials and Energy, Institute Seminar*, 19.09.2008, Berlin, Germany.
- T. Schmid, C. Camus, S. Lehmann, D. Abou-Ras, C.-H. Fischer, M.C. Lux-Steiner, R. Zenobi: Spatially resolved characterization of chemical species and crystal structures in CuInS₂ and CuGa_xSe_y thin films using Raman microscopy. *ICTMC-16*, 15.-19.09.2008, Berlin, Germany.
- T. Schmid, B.S. Yeo, J. Stadler, R. Zenobi: Investigation of Biomolecules and Biological Nanostructures Using a Combined AFM-CLSM-Raman setup and tip-enhanced Raman spectroscopy (TERS). *Seeing at the Nanoscale VI*, 09.-11.07.2008, Berlin, Germany.
- T. Schmid: Biofilme: Bedeutung und Analytik. **Invited Talk**, *IGAS@Adlershof, Jahreskolloquium 2007*, 08.11.2007, Berlin, Germany.
- T. Schmid, B.S. Yeo, W. Zhang, R. Zenobi: Imaging and Chemical Analysis of Biological Nanostructures Using a Setup for Tip-Enhanced Raman Spectroscopy (TERS). *SCS Fall Meeting 2007*, 12.09.2007, Lausanne, Switzerland.
- T. Schmid, J. Burkhard, R. Zenobi: Nanometer Scale Topographic and Chemical Imaging of Biofilms by Atomic Force Microscopy and Raman Spectroscopy, *SCS Fall Meeting 2006*, 13.10.2006, Zurich, Switzerland.
- T. Schmid: Analytik wässriger Proben mittels photoakustischer Spektroskopie, *Kolloquium des Engler-Bunte-Instituts der Universität Karlsruhe*, 21.01.2005, Universität Karlsruhe.
- T. Schmid: Optothermische Sensorik an flüssigen Medien, *Sitzung des Arbeitsausschusses „Sensortechnik“ der DECHEMA*, 17.01.2005, Forschungszentrum Karlsruhe.
- T. Schmid: Laserinduzierte Photoakustische Spektroskopie als Sensorprinzip: Anwendungen in der Prozess- und Umweltanalytik, *Sitzung des Kreises der Freunde des Instituts für Wasserchemie*, 24.09.2004, Stadtwerke Augsburg.
- T. Schmid: Fast Screening of Bioaerosols, Inorganic and Organic Particles by Raman Spectroscopy, *European Space Agency (ESA) "Boundary" Project Meeting*, 29.06.2004, Universität Duisburg-Essen.
- H. Prestel, T. Schmid, R. Nießner, U. Panne: Charakterisierung von Kläranlagen-Kolloiden mittels Asymmetrischer Fluss-Feldflussfraktionierung (AF⁴) und Massenspektroskopie mit induktiv gekoppeltem Plasma (ICP-MS), *Jahrestagung der Wasserchemischen Gesellschaft 2003*, 26.-28.05.2003, Stade.
- U. Panne, T. Schmid, C. Haisch, R. Niessner: Biofilm Monitoring by Photoacoustic Spectroscopy, *FACCS 2002*, 13.-17.10.2002, Providence (RI), USA.
- T. Schmid, U. Panne, C. Haisch, R. Niessner: Process Analysis of Biofilms by Photoacoustic Spectroscopy, *Euroanalysis XII*, 08.-13.9.2002, Dortmund.
- T. Schmid, U. Panne, C. Haisch, R. Niessner: Biofilm Monitoring by Photoacoustic Spectroscopy (PAS), *International Specialised Conference on Biofilm Monitoring*, 17.-20.3.2002, Porto, Portugal.
- T. Schmid, U. Panne, C. Haisch, R. Niessner: Investigation of Biofilm Growth and Detachment by Photoacoustic Spectroscopy, *1st Late Summer Workshop "Interfaces in Aquatic Systems – Colloids, Biofilms, Sediment/Water/Air"*, 01.-03.10.2001, Schloss Maurach. **Travel grant awarded by the German Hydrochemical Society.**

T. Schmid, U. Panne, C. Haisch, R. Niessner: Investigation of Biofilm Growth and Detachment by Photoacoustic Spectroscopy, *5th Euroconference on Environmental Analytical Chemistry*, 09.–12.09.2001, Blarney, Ireland. **Travel grant.**

T. Schmid, U. Panne, C. Haisch, R. Nießner: Untersuchung des Einflusses von Prozessparametern auf Architektur und Stabilität von Biofilmen mittels Tiefenaufgelöster Photoakustischer Spektroskopie (PAS), *Jahrestagung der Wasserchemischen Gesellschaft 2001*, 21.–23.05.2001, Bad Wildungen. **Travel grant awarded by the German Hydrochemical Society.**

T. Schmid, C. Kopp, U. Panne, R. Nießner: Tiefenaufgelöste Photoakustische Spektroskopie an Biofilmen, *Jahrestagung der Wasserchemischen Gesellschaft 2000*, 29.–31.05.2000, Weimar. **Travel grant awarded by the German Hydrochemical Society.**

POSTER PRESENTATIONS

T. Schmid, P.L. Urban, A. Amantonico, R. Zenobi: Multiparameter Analysis of Single Algal Cells by Integrating Raman and Fluorescence Microscopy with Mass Spectrometry. *SCS Fall Meeting 2011*, 09.09.2011, Lausanne, Switzerland.

T. Schmid, J. Stadler, L. Opilik, R.M. Balabin, R. Zenobi: Nanoscale Chemical Analysis of Transparent and Opaque Samples by Tip-Enhanced Raman Spectroscopy. *SCS Fall Meeting 2011*, 09.09.2011, Lausanne, Switzerland.

T. Schmid, P.L. Urban, A. Amantonico, R. Zenobi: Multiparameter Analysis of Single Algal Cells by Integrating Raman and Fluorescence Microscopy with Mass Spectrometry. *Anakon 2011*, 22.–25.03.2011, Zurich, Switzerland. **1st poster award.**

T. Schmid, J. Stadler, L. Opilik, R.M. Balabin, R. Zenobi: Nanoscale Chemical Analysis of Transparent and Opaque Samples by Tip-Enhanced Raman Spectroscopy. *Anakon 2011*, 22.–25.03.2011, Zurich, Switzerland.

T. Schmid, J. Stadler, L. Opilik, R.M. Balabin, R. Zenobi: Tip-Enhanced Raman Spectroscopy for Nanoscale Chemical Analysis of Transparent and Opaque Samples. *SCS Fall Meeting*, 16.09.2010, Zurich, Switzerland.

A. Sebesta, T. Schmid, R. Zebobi: Nanoscale Analysis of Biological Samples Using AFM and Raman Microscopy. *SCS Fall Meeting*, 04.09.2009, Lausanne, Switzerland.

J. Stadler, T. Schmid, R. Zebobi: Development of a Standard Sample for Tip-Enhanced Raman Spectroscopy. *SCS Fall Meeting*, 04.09.2009, Lausanne, Switzerland.

T. Schmid, J. Stadler, R. Zenobi, Ch. Camus, S. Lehmann, D. Abou-Ras, Ch.-H. Fischer, M. Ch. Lux-Steiner: Chemical Imaging of Thin-Film Solar Cell Materials Using Raman Microscopy. *Analytical Chemistry Symposium 'Analyze That'*, 13.05.2009, Zurich, Switzerland. **Best poster award.**

T. Schmid, B. S. Yeo, R. Zenobi: Biological Applications of Combined Atomic Force Microscopy-Raman Spectroscopy and Tip-Enhanced Raman Spectroscopy. *Analytical Chemistry Symposium 'Analyze That'*, 13.05.2009, Zurich, Switzerland.

J. Stadler, T. Schmid, R. Zenobi: Untersuchung an Diamant-Nanopartikeln als Standard für hochauflösende spitzenverstärkte Ramanspektroskopie. *Anakon 2009*, 17.–20.03.2009, Berlin, Germany.

T. Schmid, B.S. Yeo, R. Zenobi: Biological Applications of Combined Atomic Force Microscopy (AFM)-Raman and Tip-Enhanced Raman Spectroscopy. *SCS Fall Meeting 2008*, Zurich, Switzerland.

T. Schmid, B.S. Yeo, R. Zenobi: Biological Applications of Combined AFM-Raman and Tip-Enhanced Raman Spectroscopy. *NFO 10*, 01.–05.09.2008, Buenos Aires, Argentina. **Travel grant awarded by the Analytical Division of the German Chemical Society (GDCh).**

T. Schmid, R. Zenobi: Imaging and Chemical Analysis of Biological Nanostructures Using a Setup for Tip-Enhanced Raman Spectroscopy (TERS). *ICN+T 2007*, 02.–06.07.2007, Stockholm, Sweden. **Travel grant awarded by the Analytical Division of the Swiss Chemical Society (SCS).**

T. Schmid, J. Burkhard, R. Zenobi: Nanometer Scale Topographic and Chemical Imaging of Biofilms by Atomic Force Microscopy and Raman Spectroscopy, *NFO 9*, 11.–15.09.2006, Lausanne, Switzerland.

T. Schmid, T. Schmitz, B.S. Yeo, W. Zhang, R. Zenobi: Molecular Nanodiagnostics, *ETH Industry Day*, 04.09.2006, Zurich, Switzerland.

T. Schmid, J. Burkhard, R. Zenobi: Nanometer Scale Topographic and Chemical Imaging of Biofilms by Atomic Force Microscopy and Raman Spectroscopy, *ICN+T 2006*, 30.07.–04.08.2006, Basel, Switzerland.

T. Schmid, J. Burkhard, R. Zenobi: Nanometer Scale Topographic and Chemical Imaging of Biofilms by Atomic Force Microscopy and Raman Spectroscopy, *CEAC Workshop on Nanoanalysis*, 10.–11.07.2006, Zurich, Switzerland.

T. Schmid, R. Nießner: Analytik wässriger Proben mittels photoakustischer Spektroskopie, *Anakon 2005*, 15.–18.03.2005, Regensburg, Germany. **2nd poster award.**

T. Schmid, U. Panne, C. Haisch, R. Nießner: Laserinduzierte photoakustische Spektroskopie als Sensorprinzip: Anwendungen in der Prozess- und Umweltanalytik. *Jahrestagung der Wasserchemischen Gesellschaft 2004*, 17.–19.05.2004, Bad Saarow, Germany.

T. Schmid, U. Panne, C. Haisch, R. Nießner: Online-Monitoring von Biofilmen mittels photoakustischer Spektroskopie. *Jahrestagung der Wasserchemischen Gesellschaft 2003*, Stade, 26.–28.05. 2003.

T. Schmid, C. Helmbrecht, C. Haisch, U. Panne, R. Nießner: Online-Analytik opaker Flüssigkeiten mittels photoakustischer Spektroskopie. *Anakon 2003*, Konstanz, 02.–05.04. 2003.

T. Schmid, U. Panne, C. Haisch, R. Nießner: Online-Monitoring von Biofilmen mittels photoakustischer Spektroskopie. *Anakon 2003*, Konstanz, 02.–05.04. 2003.

T. Schmid, C. Helmbrecht, C. Haisch, U. Panne, R. Nießner: On-line Monitoring of Opaque Liquids by Photoacoustic Spectroscopy, *Euroanalysis XII*, 8.–13.09.2002, Dortmund. **2nd poster award.**

T. Schmid, U. Panne, R. Nießner: On-line Monitoring of Biofilm Growth and Detachment by Photoacoustic Spectroscopy, *12th International Conference on Photoacoustic and Photothermal Phenomena*, 24.–27.06.2002, Toronto, Canada.

T. Schmid, U. Panne, C. Haisch, R. Nießner: Untersuchung von Biofilmen mittels Photoakustischer Spektroskopie (PAS), *GVC/DEHEMA-Jahrestagungen 2002*, 11.–13.06.2002, Wiesbaden. **Travel grant awarded by Max-Buchner-Forschungstiftung.**

T. Schmid, U. Panne, C. Haisch, R. Nießner: Untersuchung von Biofilmen mittels Photoakustischer Spektroskopie (PAS), *Jahrestagung der Wasserchemischen Gesellschaft 2002*, 06.-08.05.2002, Eichstätt. **Travel grant awarded by the German Hydrochemical Society.**

T. Schmid, U. Panne, C. Haisch, R. Nießner: On-line-Analytik von Biofilmen mittels tiefenaufgelöster Photoakustischer Spektroskopie (PAS), *Anakon 2001*, 04.–07.04.2001, Konstanz.

T. Schmid, C. Kopp, U. Panne, R. Niessner: Depth-Resolved Analysis of Biofilms by Photoacoustic Spectroscopy, *Euroanalysis XI*, 03.-09.09.2000, Lisbon, Portugal.

Zurich, 05 October 2011