

PERSONAL PROFILE

Qualifications: PDF, Ph.D., M.Sc., NET

ACADEMIC PROFILE

Post-Doctoral Research

Duration: 2015-16

Institution: University of Koblenz-Landau, Landau, Germany

Topic: "Development of Atomic Force Microscopy assisted nanothermal analysis (AFM-nTA) for applications in complex systems"

Doctoral Research

Year of award: 2013

Institution: University of Koblenz-Landau, Landau, Germany

Title: "Insight into physicochemical structure of soil organic matter by cation interaction and nanothermal properties"

Supervised by Prof. Dr. G.E. Schaumann, Dean, Faculty of Physical Sciences, University Koblenz-Landau, Germany

M.Sc. (Hydrochemistry)

Year of qualification: 2008

Institution: Department of Chemical Oceanography, Cochin University of Science And Technology

CAREER PROFILE

March 2014-till date: Assistant Professor in Chemistry, NSS College, Manjeri

September 2013-March 2014: Ad-hoc Faculty in Environmental Chemistry, Central University of Kerala, Kasargod

October 2009-September 2013: Scientific Staff, Department of Environmental Chemistry, University Koblenz-Landau, Germany

April 2010-March 2012: Part-time lecturer in Soil Chemistry at University Koblenz-Landau, Landau, Germany

June 2008-September 2009: Project Assistant II, Central NMR Facility, National Chemical Laboratory, Pune

TEACHING & RESEARCH INTERESTS

- Supramolecular chemistry
- Molecular Spectroscopy
- Instrumental methods in Chemistry / Analytical chemistry
- Thermodynamics
- Chemistry of the Environment
- Quantum chemistry

Research Interest:

- Supramolecular interactions in complex natural materials
- Interactions of functionalized and non-functionalized nanoparticles in soils and dissolved organic matter
- Environmental consequences of Soil Microplastics

- Development of high resolution techniques, mainly AFM-assisted nanothermal analysis, to identify material characteristics in complex natural systems with a view to identify process-specific hotspots
- Development of lipid-based drug delivery systems, based on supramolecular interactions
- Physical modification of hyaluronan to achieve properties optimal for various applications
- Assessment of soil- and water quality in localities exposed to strong anthropogenic intrusions with a view to suggest potential remedies

PUBLICATIONS

1. Schaumann, G.E; Kunhi Mouvenchery, Yamuna. (2018) Considerations on cross-linking by bivalent cations in soil organic matter with low exchange capacity. *Journal of Plant Nutrition and Soil Science (In Production)*, DOI: 10.1002/jpln.20170024
2. Kunhi Mouvenchery, Yamuna.; Schaumann, G.E. (2018) Cation binding in a soil with low exchange capacity: implication for the structural rigidity of soil organic matter, *Journal of Plant Nutrition and Soil Science*, (Published on line in December 2017, print in production) DOI:10.1002/jpln.201600506
3. Kučerík, J; Ondruch, P.; Kunhi Mouvenchery, Yamuna.; Schaumann, G.E. (2018) Formation of water molecule bridges govern water sorption mechanism in soil organic matter, *Langmuir*, 34 (40), 12174-12182
4. Bakarić, D.; Petrov,D.; Kunhi Mouvenchery, Yamuna. et al.; 2018, Ion-induced modification of the sucrose network and its impact on melting of freeze-dried liposomes- DSC and molecular dynamics study, *Chemistry and physics of lipids*, 210, 38-46
5. Pronk, G.J.; Heister, K.; C. Babin,V.D.; Bachmann, J.; Ding, G.;Ditterich, F.;Gerzabek, M.H.;Giebler, J.;Hemkemeyer, M.; Kandeler, E.; Kunhi Mouvenchery, Yamuna. et al.; (2017)Interaction of minerals, organic matter, and microorganisms during biogeochemical interface formation as shown by a series of artificial soil experiments, *Biology and fertility of soils*, 53 (1), 9-22
6. Kunhi Mouvenchery, Yamuna.; Miltner, A.; Schurig, C.; Kästner, M.; Schaumann, G. E.; (2016) Linking atomic force microscopy with nanothermal analysis to assess microspatial distribution of material characteristics in young soils, *Journal of Plant Nutrition and Soil Science*. 000: 1-12
7. Jaeger, A., Schwarz, J., Kunhi Mouvenchery, Yamuna.,Schaumann, G.E., Bertmer, M., (2016) Physical long term regeneration dynamics of soil organic matter as followed by ¹H solid-state NMR methods. *Environmental Chemistry*. 13: 50-57
8. Kunhi Mouvenchery, Yamuna.,Jäger, A., Aquino, A.J.A., Tunega, D, Diehl, D., Bertmer, M., Schaumann, G.E. (2013) Restructuring of a peat in interaction with multivalent cations: Effect of cation type and aging time. *PLoS ONE* 8(6): e65359. doi:10.1371/journal.pone.0065359
9. Shchegolikhina A; Kunhi Mouvenchery, Yamuna; Woche, S.K; Bachmann, J; Schaumann, G.E; Marschner, B (2013). Cation treatment and drying temperatures effects on nonylphenol and phenanthrene sorption isotherms of a sandy soil. *Journal of Plant Nutrition and Soil Science*. 000: 1-9
- 10.Schaumann, G. E; Gildemeister, D; Kunhi Mouvenchery,Yamuna; Diehl, D; Spielvogel (2013) Interactions between cations and water molecule bridges in soil organic matter. *Journal of Soils and Sediments*. 13: 1579-1588

11. Schaumann, G.E; Kunhi Mouvenchery, Yamuna (2012) Potential of AFM-Nanothermal Analysis to study the microscale thermal characteristics in soils and natural organic matter (NOM). *Journal of Soils and Sediments*. 12, 2-16
12. Kunhi Mouvenchery, Yamuna; Kučerík, J; Diehl, D; Schaumann, G.E (2012) Cation-mediated cross-linking in natural organic matter – a review. *Reviews in Environmental Science and Bio/technology*. 11, 41-54
13. Rieger, M; Schaumann, G. E; Kunhi Mouvenchery, Yamuna; Reinhard, N; Seidel, M; Baumann, T (2012) Antibody-Labeled Nanoparticles for the Visualization of Surface-172 immobilized Benzo[a]Pyrene Using NMR Relaxometry and Magnetic Resonance Imaging. *Journal of Analytical and Bioanalytical Chemistry*. 403.

PARTICIPATIONS / PRESENTATIONS

1. Served as resource person for three-days National Seminar, organized by the PG Department of History, NSS College, Manjeri and delivered a lecture on ‘Clocks in the Rocks: Derivative Dating Methods in Archaeology’ on 07/03/2019
2. Delivered a talk on ‘Nanoscale thermal analysis of complex natural organic matter’ at National Seminar, Organized by Govt. Brennen College, Thalassery in November 2018
3. Invited to deliver keynote talk on ‘Supramolecular chemistry: ideas beyond molecules’ at PSMO College, Thirurangadi, Kerala on 27/02/2018, as part of the National Science Day celebration, funded by KSCSTE
4. Served as resource person for the Extension Activity, organized by the Department of Chemistry, NSS College, Ottappalam and delivered a lecture on ‘Plastics: Boon or Bane?’ on 27/02/2017
5. Served as resource person for Class on Research Methodology, organised Forum, NSS College, Manjeri on 18/11/2016
6. Served as resource person for the Walk With Scholar Program, organised at NSS College, Manjeri and delivered a lecture on ‘Scientific Attitude’ on 04/11/2016
7. Invited to deliver special talk on ‘Sophisticated instruments and their applications’ at KAHM Unity women’s college, Manjeri, Kerala on 04/12/2014, as part of the National Science Day celebration, funded by KSCSTE
8. ‘Atomic force microscopy assisted nanothermal analysis- potentials and challenges’(Oral) National Conference on Characterization Techniques in Chemistry, conducted by KKTM Govt. College, Kodungallur, Kerala during 16-12-2014 and 17-12-2014, funded by UGC
9. ‘Organic functional group density and structural dynamics of soil organic matter take key role in cation bridge formation’ (Oral) International Symposium on Biogeochemical interfaces in soils, organized by Friedrich- Schiller University, Jena, Germany and funded by the German Research Foundation (DFG), during 06-10-2014 and 08-10-2014
10. ‘AFM-nTA: a new tool to dig out nanoscale thermal properties at spatial resolution of nanometers’ (Oral) Annual conference of German Soil Science Society, 2013, Rostock, Germany
11. ‘Nano and microspatial distribution of mineral and organic minerals in young soils as assessed by AFM-nanothermal analysis (AFM-nTA)’ (Oral) SPP 1315 Annual Meeting 2012. Dornburg, Germany

12. 'Nanoscale thermal behaviour of microbially derived organic materials in soils' (Oral) TG 4 meeting 2012 (SPP 1315). Bayreuth, Germany
13. 'Interactions of multivalent cations with soil organic matter samples with differing cation exchange capacity, studied with a special focus on effects of aging' (Poster). SPP 1315 Annual Meeting 2012. Dornburg, Germany
14. 'Development in proton mobility and organic matter quality during maturation of artificial soils' (Poster). SPP 1315 Annual Meeting 2012. Dornburg, Germany
15. 'Are surface properties of microbes governing mineral-microbial interactions?' (Poster). SPP 1315 Annual Meeting 2012. Dornburg, Germany
16. 'AFM-Nanothermal Analysis to study the nano- and microscale thermal characteristics in soils and natural organic matter (NOM)' (Poster). SPP 1315 Annual Meeting 2011. Dornburg, Germany
17. 'Water molecular bridges and cation bridges as validated by three different independent instrumental techniques- NMR, DSC and AFM-NTA' (Poster). SPP 1315 Annual Meeting 2011. Dornburg, Germany
18. 'Multivalent Cations and Soil Organic Matter- Effects of Reaction Conditions on Binding and on Properties of Resulting Complex' (Poster). German Soil Science Society Annual Seminar 2011. Berlin, Germany
19. 'Cross-linking Effects of Multivalent Cations on Soil Organic Matter' (Poster). Conference "Co-Evolution of soil and organic substances" 2011. Landau. Germany

PROGRAMMES ORGANISED

1. Coordinator of the World Space Week Observance program, organised by IQAC, NSS College, Manjeri, in association with VSSC, Thiruvananthapuram, in October 2019.
2. Coordinator of Environment day Observance program, organised by the Department of Chemistry, NSS College, Manjeri, and funded by Kerala State Council for Science, Technology and Environment, in June 2019.
3. Coordinator of National Science Day Celebrations, organised by the Department of Chemistry, NSS College, Manjeri, in February 2019
4. Coordinator of National Science Day Celebrations, organised by the Science Forum, NSS College, Manjeri, in February 2019
5. Coordinator of two-days 'Science workshop', organised by the Science Forum, NSS College, Manjeri, in October 2019
6. Coordinator of the Extension Activity of the Department of Chemistry, NSS College, Manjeri, 2018-19 entitled 'Better management of Plastics and Plastic Wastes'
7. Coordinator of Environment day Observance program, funded by Kerala State Council for Science, Technology and Environment, at NSS College, Manjeri, in June 2017.
8. Coordinator of the Extension Activity of the Department of Chemistry, NSS College, Manjeri, 2016-17 entitled 'Better management of Soil and Water'
9. Coordinator of the organizational committee of 'Workshop on Microscale Experiments', funded by Kerala State Council for Science, Technology and Environment and conducted by the Department of Chemistry, N.S.S. College, Manjeri, Kerala in January 2015
10. Coordinator of Ozone-day celebrations, organised by the Department of Chemistry, N.S.S. College, Manjeri, Kerala in September 2014

11. Coordinator of the organizational committee of 'Environmental Conference 2014', conducted by the Department of Environmental Science Department, Central University of Kerala in February 2014
12. Member of the organizational committee of the international conference 'Co-Evolution of soil and organic substances' conducted by the University of Koblenz-Landau, Landau, Germany in March 2011

AWARDS AND RECOGNITIONS

1. UGC-Raman PDF, 2016
2. FLAIR membership, 2016
3. Recognition as Ph.D. research guide, by University of Calicut, 2019