

Katherine M. Manfred

CONTACT INFORMATION	katherine.manfred@noaa.gov +1 303 886 0828	NOAA ESRL R/CSD2 325 Broadway, Boulder CO 80305, USA
RESEARCH INTERESTS	Optical spectroscopy, instrument development, trace gas and aerosol detection	
EDUCATION	DPhil, Physical and Theoretical Chemistry University of Oxford, Oxford, UK	<i>February 2016</i>
	B.S., Chemistry B.S., Physics – Meteorology track University of Maryland, College Park, MD, USA <i>Summa Cum Laude and Chemistry with High Honors; GPA: 4.0</i>	<i>May 2008</i>
RESEARCH EXPERIENCE	Research Associate Cooperative Institute for Research in Environmental Sciences, CU Boulder Earth System Research Laboratory, NOAA Topic: Measurement of biomass burning aerosol scattering phase functions using imaging nephelometer Supervisor: Dr. Daniel Murphy	<i>February 2016 to present</i>
	DPhil Candidate Department of Chemistry, University of Oxford Topic: Mid-infrared laser spectroscopy for trace gas detection Supervisor: Professor Grant Ritchie	<i>October 2012 to January 2016</i>
	Undergraduate Research Assistant Department of Chemistry and Biochemistry, University of Maryland Topic: Investigation of the interfacial organization of acetonitrile and benzene using vibrational sum frequency generation spectroscopy Supervisor: Professor John Fourkas	<i>October 2008 to May 2012</i>
	Visiting Student School of Chemistry, University of Bristol Topic: Influence of relative humidity on the optical properties of aerosols investigated with cavity ring-down spectroscopy Supervisor: Professor Andrew Orr-Ewing	<i>October 2010 to May 2011</i>
	Summer Intern Laboratory for Laser Energetics, University of Rochester Topic: Polar direct-drive simulations for a laser-driven HYLLIFE-II fusion reactor Supervisor: Dr. Stephen Craxton	<i>Summers 2007 to 2008</i>
PEER-REVIEWED JOURNAL PUBLICATIONS	<ol style="list-style-type: none">Manfred, K. M.; Washenfelder, R. A.; Wagner, N. L.; Adler, G.; Erdesz, F.; Womack, C.; Lamb, K.; Schwarz, J. P.; Franchin, A.; Selimovic, V.; Yokelson, R. J.; Murphy, D. M., "Investigating biomass burning aerosol morphology using a laser imaging nephelometer" <i>Atmos. Chem. Phys.</i> [In preparation]Manfred, K. M.; Hunter, K. M.; Ciaffoni, L.; Ritchie, G. A. D., "ICL-based OF-CEAS: A sensitive tool for analytical chemistry". <i>Anal. Chem.</i> 89: 902–909 (2017).Manfred, K. M.; Ciaffoni, L.; Ritchie, G. A. D., "Optical-feedback cavity-enhanced absorption spectroscopy in a linear cavity: model and experiments". <i>Appl. Phys. B</i> 120:329–339, 2015.Manfred, K. M.; Ritchie, G. A. D.; Lang, N.; Röpcke, J.; van Helden, J. H., "Optical feedback cavity-enhanced absorption spectroscopy with a 3.24 μm interband cascade laser." <i>Appl. Phys. Lett.</i> 106: 221106, 2015.	

5. **Manfred, K. M.**; Kirkbride, J. M. R.; Ciaffoni, L.; Peverall, R.; Ritchie, G. A. D., “Enhancing the sensitivity of mid-IR quantum cascade laser-based cavity-enhanced absorption spectroscopy using RF current perturbation”. *Opt. Lett.* 39: 6811–6815, 2014.
6. Rivera, C. A.; Souna, A. J.; Bender, J. S.; **Manfred, K.**; Fourkas, J. T., “Reorientation-induced spectral diffusion in vibrational sum-frequency-generation spectroscopy.” *J. Phys. Chem. B* 117: 15875–15885, 2013.
7. Rivera, C. A.; Bender, J. S.; **Manfred, K.**; Fourkas, J. T., “Persistence of acetonitrile bilayers at the interface of acetonitrile/water mixtures with silica.” *J. Phys. Chem. A* 117:12060–12066, 2013.
8. Mason, B. J.; King, S-J.; Miles, R. E. H.; **Manfred, K. M.**; Rickards, A. M. J.; Kim, J.; Reid, J. P.; Orr-Ewing, A. J., “Comparison of the accuracy of aerosol refractive index measurements from single particle and ensemble techniques.” *J. Phys. Chem. A* 116:8547–8556, 2012.
9. Ding, F.; Rivera, C.; Zhong, Q.; **Manfred, K.**; He, X.; Brindza, M. R.; Walker, R. A.; Fourkas, J. T., “Structure and dynamics of trimethylacetonitrile at the silica/vapor, silica/liquid, and liquid/vapor interfaces.” *J. Phys. Chem. C* 116:7000-7009, 2012.
10. Ding, F.; Zhong, Q.; **Manfred, K.**; He, X.; Brindza, M. R.; Walker, R. A.; Fourkas, J. T., “Structure of liquid propionitrile at interfaces: 2. Experiment.” *J. Phys. Chem. C* 116:4019–4025, 2012.
11. Ding, F.; Hu, Z.; Zhong, Q.; **Manfred, K.**; Gattass, R. R.; Brindza, M. R.; Fourkas, J. T.; Walker, R. A.; Weeks, J. D., “Interfacial organization of acetonitrile: simulation and experiment.” *J. Phys. Chem. C* 114:17651–17659, 2010. (cover)
12. **Manfred, K.**; He, X.; Fourkas, J. T., “Assessing the role of moment of inertia in optical Kerr effect spectroscopy.” *J. Phys. Chem. B* 114:12096–12103, 2010.

AWARDS

Scholarships

Clarendon Scholarship, University of Oxford	<i>October 2012 to October 2015</i>
Barry M. Goldwater Scholarship	<i>March 2010</i>
Arnold Beckman Scholarship	<i>June 2009 to August 2010</i>
Banneker-Key Scholarship, University of Maryland	<i>August 2008 to May 2012</i>
J. R. Dorfman Prize for Undergraduate Research	<i>May 2012</i>
Undergraduate Researcher of the Year, UMD	<i>April 2012</i>

Other awards

Achievement Award, Chemical Society of Greater Washington	<i>January 2012</i>
Best Chemistry Student of the Year Finalist, SET Awards	<i>September 2011</i>
Undergraduate Award in Analytical Chemistry, ACS	<i>May 2010</i>
Undergraduate Award, Greater Washington Institute of Chemists	<i>May 2010</i>
Semi-finalist, Intel Science Talent Search	<i>January 2008</i>

PRESENTATIONS

Poster Presentations

AGU Fall Meeting, New Orleans, LA, USA [submitted]	<i>December 2017</i>
FLAIR, Florence, Italy	<i>May 2014</i>
ACS Fall National Meeting, Boston, MA, USA	<i>August 2011</i>
Beckman Conference, Irvine, CA, USA	<i>July 2010</i>
APS/DLS Frontiers in Optics Conference, San Jose, CA, USA	<i>Oct 2009</i>

Seminars

Spectroscopy and Dynamics Seminar, University of Oxford, UK	<i>January 2015</i>
Southern Univ. Spectroscopy and Dynamics Conference, Oxford, UK	<i>July 2015</i>

RESEARCH SKILLS Computer software

Extensive utilisation of LabVIEW for instrument control, data acquisition, and calculations

Performance of mathematical modelling using MATLAB
Data analysis and plotting with Igor, Sigmaplot, Origin, and Microsoft Excel
Document and presentation preparation using L^AT_EX and Microsoft Office products
3D visualisation and instrument design with Solidworks
Publication-quality figure production using CorelDraw

Laser systems

Nd:YAG (frequency-doubled)
Mode-locked Ti:Sapphire oscillators
Optical parametric oscillators
Quantum and interband cascade lasers
Diode lasers (free space and fibre-coupled)

Sample preparation

Aerosol generation using atomisers and nebulisers
Liquid distillation for purification
Quantitative gas handling and mixing
Vacuum systems

Auxiliary measurements

Differential mobility analyser for aerosol size selection
Optical and condensation particle counters for aerosol number and size distribution characterisation
Scanning electron microscopy
FTIR spectroscopy
Laser beam imaging using microbolometers (thermal)
Lock-in amplification and frequency modulation

TEACHING
EXPERIENCE

Research mentor, Department of Chemistry, Oxford *October 2014 to January 2016*
Mentored two chemistry masters research projects
Tutor, Worcester College, Oxford *October 2012 to June 2015*
First-year chemistry *Physical Basis of Chemistry* course
Private tutor *September 2011 to May 2012*
AP Chemistry, AP Calculus, Algebra, and Chemistry

REFERENCES

Dr. Daniel Murphy
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