

Dmitry Kurouski

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Texas A&M University
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PROFESSIONAL APPOINTMENTS

08.2017 – present Assistant Professor, Biochemistry and Biophysics, **Texas A&M University**.

POSTDOCTORAL RESEARCH AND INDUSTRIAL EXPERIENCE

11.2015 – 06.2017 Senior Research Scientist, R&D, **Boehringer-Ingelheim Pharmaceuticals, Inc.**, Ridgefield, CT, USA

05.2013 – 10.2015 Chemistry Department, **Northwestern University**, Evanston, IL, USA. Postdoctoral Advisor: Prof. Richard P. Van Duyne.

EDUCATION

Ph.D. in Analytical/Physical Chemistry

01.2008 – 01.2013 Chemistry Department, **SUNY at Albany**, Albany, NY, USA.

B. Sc. And M.Sc. in Biochemistry

09.2002 – 06.2007 Biology Department, **Belarusian State University**, Minsk, Belarus.

HONORS AND AWARDS

2016 Invited Contribution to **Prominent Young Vibrational Spectroscopists** Issue of Vibrational Spectroscopy.

2014 **Best Junior Researcher Award**, International Conference on Raman Spectroscopy (ICORS 2014).

2013 **Distinguished Dissertation Award**, SUNY at Albany.

2012 **Stereochemical Society of Greater New York Travel Award**.

2012 **Student Research Award**, Department of Chemistry, SUNY at Albany.

2010 **Protein Society Travel Award**.

PRESS COVERAGE

“Hair dye could be used to track down criminals” **Science**, 2015, February 19.

“Raman technique identifies ink molecules with little damage to artifacts” **C&EN News**, 2014, June 17.

“Easy amyloid refolding”, Highlights of Chemical Biology by **Royal Society of Chemistry**, 2010, February.

“Amyloid fibrils refold spontaneously under mild conditions”, **Future Medical Chemistry**, 2010, 2:550-551.

SELECTED INVITED TALKS

1. **Kurouski D.** (2018): “Detection and Identification of Plant Pathogens with a Handheld Raman Spectrometer”, *ICORS-2018*, Jeju, South Korea.
2. **Kurouski D.** (2018): “Detection and Identification of Crop Pathogens with a Raman Spectroscopy”, *The 27th International Laser Physics Workshop*, Nottingham, UK.
3. **Kurouski D.** (2018): “Raman Spectroscopy From Concepts to Practical Applications”, *ACS Symposium*, Houston, TX, USA.
4. **Kurouski D.** (2018): “Tip-Enhanced Raman Spectroscopy in Biology and Electrochemistry”, *PQE*, Salt Lake City, UT, USA.
5. **Kurouski D.** (2017): “Detection and Identification of Dyes for Forensic Purposes Using TERS and SERS”, *SciX*, Reno, ND, USA.
6. **Kurouski D.** (2017): “Tip-Enhanced Raman Spectroscopy: An Emerging Tool for Probing Biology and Electrochemistry at the Nanoscale”, *SciX*, Reno, ND, USA.
7. **Kurouski D.** (2016): “Detection of β -sheet-rich insulin oligomers and organic dyes using surface-enhanced Raman spectroscopy (SERS). A new approach in neurodegenerative diseases and forensics”, *SciX*, Minneapolis, MN, USA.
8. **Kurouski D.** (2015): “An application of SERS in forensics: Hair Dyes”, *SciX*, Providence, RI, USA.
9. **Kurouski D.** (2015): “Statics and dynamics of amyloid fibril polymorphs probed by vibrational circular dichroism (VCD) and Raman spectroscopy”, *International Conference on Vibrational Optical Activity (VOA-4)*, Baoding, China.
10. **Kurouski D.** (2014): “Amyloid fibril polymorphism: statics and dynamics.”, *International Conference on Raman Spectroscopy (ICORS-2014)*, Jena, Germany.
11. **Kurouski D.** (2012): “Spontaneous refolding of amyloid fibrils from one polymorph to another”, *Pittsburgh Conference (PittCon)*, Orlando, FL, USA

● Oral and poster presentation on more than 40 national and international conferences and symposia.

LIST OF PUBLICATIONS

Reviews and book chapters:

1. **Kurouski, D.**, Lee, H., Roschangar, F., Senanayake, C. (2017) Surface-Enhanced Raman Spectroscopy: From Concept to Practical Application. *Spectroscopy Magazine*, **32**, 36-44.
2. **Kurouski, D.** (2017) Advances of Vibrational Circular Dichroism (VCD) in Bioanalytical Chemistry. A Review. *Anal. Chim. Acta*, **990**, 54-66.
3. **Kurouski, D.** (2017) Advances of tip-enhanced Raman spectroscopy (TERS) in electrochemistry, biochemistry, and surface science. *Vibr. Spectrosc.*, **91**, 3-15.

- Jiang, N., **Kurouski, D.**, Pozzi, E.A., Chiang, M., Hersam, M.C., Van Duyne, R.P. (2016) Tip-enhanced Raman spectroscopy: From concepts to practical applications. *Chem. Phys. Lett.*, **659**, 16-24.
- Kurouski, D.** (2016) Supramolecular Organization of Amyloid Fibrils. In *Amyloids*, ed: Escamilla, A.M.F., Intech, ISBN 978-953-51-4716-9.
- Kurouski, D.***, Van Duyne, R.P., Lednev, I.K. (2015): Exploring the Structure and Formation Mechanism of Amyloid Fibrils by Raman Spectroscopy: A Review. *Analyst*, **140**, 4967-4980.

Research articles:

- Farber, C. and **Kurouski, D.** (2018) Detection and Identification of Plant Pathogens on Maize Kernels with a Hand-Held Raman Spectrometer. *Anal. Chem.*, **90**, 3009-3012.
- Qu, B., Mangunuru, H.P.R., Tcyrulnikov, S., Rivalti, D., Zatolochnaya, O., **Kurouski, D.**, Radomkit, S., Biswas, S., Karyakarte, S., Fandrick, K.R., Sieber, J.D., Rodriguez, S., Desrosiers, N.-J., Haddad, N., Grinberg, N., Yee, N.K., Song, J.J., Kozlowski, M.C., Senanayake, C.H. (2018) Enantioselective Synthesis of α -(Hetero)aryl Piperidines through Asymmetric Hydrogenation of Pyridinium Salts and Its Mechanistic Insights. *J. Org. Chem.* in press.
- Sieber, J.D., Rodriguez, S., Frutos, R., Buono, F., Zhang, Y., Li, N., Qu, B., Premasiri, A., Li, Z., Han, Z., Xu, Y., Bryne, D., Haddad, N., Lorenz, J., Grinberg, N., **Kurouski, D.**, Lee, H., Narayanan, B., Nummy, L., Mulder, J., Brown, J., Granger, A., Krawiec, M., Williams, Z., Pennino, S., Song, J., Hossain, A., Yee, N., Brusacca, C., Roschangar, F., Xin, Y., Mao, Z., Zhang, X., Hong, Y., Senanayake, C.H. (2018) Development of a Scalable, Chromatography-Free Synthesis of t-Bu-SMS-Phos and Application to the Synthesis of an Important Chiral CF₃-Alcohol Derivative in High Enantioselectivity Using Rh-Catalyzed Asymmetric Hydrogenation. *J. Org. Chem.*, **83**, 1448-1461.
- Kurouski, D.**, Large, N., Chiang, N., Henry, A. -I., Seideman, T., Schatz, G.C., Van Duyne, R.P. (2017) Unraveling Near- and Far-Field Relationship of 2D SERS Substrates Using Wavelength-Scanned Surface-Enhanced Raman Excitation Spectroscopy (WS-SERES). *J. Phys. Chem. C*, **121**, 14737-14744.
- Desrosiers, J.N., Wen, J., Tcyrulnikov, S., Biswas, S., Qu, B., Hie, L., **Kurouski, D.**, Wu, L., Grinberg, N., Haddad, N., Busacca, C.A., Yee, N.K., Song, J.J., Garg, N.K., Zhang, X., Kozlowski, M.C., Senanayake, C.H. (2017) Enantioselective Nickel-Catalyzed Mizoroki-Heck Cyclizations to Generate Quaternary Stereocenters. *Org. Lett.*, **19**, 3338-3341.
- Li, S.-G., Han, Z.S., Viereck, P., **Kurouski, D.**, Senanayake, C.H., Tsantrizos, Y.S. (2017) Metal-Free Cycloetherification by in Situ Generated P-Stereogenic α -

- Diazanium Intermediates: A Convergent Synthesis of Enantiomerically Pure Dihydrobenzooxaphospholes. *Org. Lett.*, **19**, 894-897.
13. Qu, B., Mangunuru, H.P.R., Wei, H., Fandrick, K.R., Desrosiers, N.-J., Sieber, J.D., **Kurouski, D.**, Haddad, N., Samankumara, L.P., Lee, H., Savoie, J., Ma, S., Grinberg, N., Sarvestani, M., Yee, N.K., Song, J.J., Senanayake, C.H. (2016) Synthesis of Enantioenriched 2-Alkyl Piperidine Derivatives through Asymmetric Reduction of Pyridinium Salts. *Org. Lett.*, **18**, 4920-4923.
 14. Haddad, N., Mangunuru, H.P.R., Fandrick, K.R., Qu, B., Sieber, J.D., Rodriguez, S., Desrosiers, N.-J., Patel, N. D., Lee, H., **Kurouski, D.**, Grinberg, N., Yee, N.K., Song, J.J., Senanayake, C.H. (2016) Reengineered BI-DIME Ligand Core Based on Computer Modeling to Increase Selectivity in Asymmetric Suzuki–Miyaura Coupling for the Challenging Axially Chiral HIV Integrase Inhibitor. *Adv. Synth. Catal.*, **358**, 3522-3527.
 15. Sieber, J.D., Angeles-Dunham, V.V., Chennamadhavuni, D., Fandrick, D.R., Haddad, N., Grinberg, N., **Kurouski, D.**, Lee, H., Song, J.J., Yee, N.K., Mattson, A.E., Senanayake, C.H. (2016) Rhodium-Catalyzed Asymmetric Allenylation of Sulfonylimines and Application to the Stereospecific Allylic Allenylation. *Adv. Synth. Catal.*, **358**, 3062-3068.
 16. Deckert-Gaudig, T., **Kurouski, D.**, Hedegaard, M., Singh, P., Lednev, I.K., Deckert, V. (2016): Spatially resolved spectroscopic differentiation of hydrophilic and hydrophobic domains on individual insulin amyloid fibrils. *Sci. Rep.*, **6**, 33575.
 17. Breydo, L., **Kurouski, D.**, Rasool, S., Milton, S., Wu, J.W., Uversky, V.N., Lednev, I.K., Glabe, C.G. (2016) Structural differences between amyloid beta oligomers. *Biochem. Biophys. Res. Commun.*, **477**, 700-705.
 18. Henry, A.-I., Sharma, B., Cardinal, M.F., **Kurouski, D.**, Van Duyne, R.P. (2016) Surface-enhanced Raman spectroscopy biosensing: In vivo diagnostics and multimodal imaging. *Anal. Chem.*, **88**, 6638–6647.
 19. **Kurouski, D.**, Chiang, N. Large, N. Greeneltch, K. T. Carron, T. Seideman, G. C. Schatz, Van Duyne, R.P. (2016): Unraveling Near-Field and Far-Field Relationships for 3D SERS Substrates – A Combined Experimental and Theoretical Analysis. *Analyst*, **141**, 1779 – 1788.
 20. **Kurouski, D.**, Mattei, M., Van Duyne, R.P. (2015): Probing Redox Reactions at the Nanoscale with Electrochemical Tip-Enhanced Raman Spectroscopy. *Nano Lett.*, **15**, 7956-7962.
 21. Shanmugasundaram, M., **Kurouski, D.**, Wan, W., Stubbs, G., Dukor, R.K., Nafie, L.A., Lednev, I.K. (2015): Rapid filament supramolecular chirality reversal of HET-s (218-289) prion fibrils driven by pH elevation. *J. Phys. Chem. B*, **119**, 8521–8525.
 22. **Kurouski, D.**, Van Duyne, R.P. (2015): In situ detection and identification of hair dyes using surface-enhanced Raman spectroscopy (SERS). *Anal. Chem.*, **87**, 2901-2906 (**highlighted by Science, ACS News, Phys.Org, The Analytical Scientist and USA Today**).

23. Rosario-Alomar, M.F., Quiñones-Ruiz, T., **Kurouski, D.**, Sereda, V., Ferreira, E.B., Jesús-Kim, L.D., Hernández-Rivera, S., Zagorevski, D.V., López-Garriga, J., Lednev, I.K. (2015): Hydrogen sulfide inhibits amyloid formation. *J. Phys. Chem. B*, **119**, 1265-1274.
24. **Kurouski, D.**, Handen, J.D., Dukor, R.K., Nafie, L.A., Lednev, I.K. (2015): Supramolecular chirality in peptide microcrystals. *Chem. Commun.*, **51**, 89-92.
25. **Kurouski, D.**, Zaleski, S., Casadio, F., Van Duyne, R.P., Shah, N.C. (2014): Tip-enhanced Raman spectroscopy (TERS) for in situ identification of indigo and iron gall ink on paper. *J. Am. Chem. Soc.*, **136**, 8677-8684 (**made C&EN news article**).
26. **Kurouski, D.**, Lu, X., Popova, L., Wan, W., Shanmugasundaram, M., Stubbs, G., Dukor, R.K., Lednev, I.K., Nafie, L.A. (2014): Is supramolecular filament chirality the underlying cause of major morphology differences in amyloid fibrils? *J. Am. Chem. Soc.*, **136**, 2302-2312.
27. **Kurouski, D.**, Deckert-Gaudig, T., Deckert, V., Lednev, I.K. (2014): Surface characterization of insulin protofilaments and fibril polymorphs using tip-enhanced Raman spectroscopy (TERS). *Biophys. J.*, **106**, 263-271 (**made a journal cover**).
28. **Kurouski, D.**, Sorci, M., Postiglione, T., Belfort, G., Lednev, I.K. (2014): Detection and structural characterization of insulin prefibrillar oligomers using surface enhanced Raman spectroscopy. *Biotechnol. Prog.*, **30**, 488-495.
29. **Kurouski, D.**, Luo, H., Sereda, V., Robb, F.T., Lednev, I.K. (2013): Deconstruction of stable cross-beta fibrillar structures into toxic and nontoxic products using a mutated archaeal chaperonin. *ACS Chem. Biol.*, **8**, 2095-2101.
30. Bhat, V., Olenick, M.B., Schuchardt, B.J., Mikles, D.C., Deegan, B.J., McDonald, C.B., Seldeen, K.L., **Kurouski, D.**, Faridi, M.H., Shareef, M.M., Gupta, V., Lednev, I.K., Farooq, A. (2013): Heat-induced fibrillation of BclXL apoptotic repressor. *Biophys. Chem.*, **179**, 12-25.
31. **Kurouski, D.**, Kar, K., Wetzel, R., Dukor, R.K., Lednev, I.K., Nafie, L.A. (2013): Levels of supramolecular chirality of polyglutamine aggregates revealed by vibrational circular dichroism. *FEBS Lett.*, **587**, 1638-1643.
32. McDonald, C.B., Bhat, V., **Kurouski, D.**, Mikles, D.C., Deegan, B.J., Seldeen, K.L., Lednev, I.K., Farooq, A. (2013): Structural landscape of the proline-rich domain of Sos1 nucleotide exchange factor. *Biophys. Chem.*, **175-176**, 54-62.
33. **Kurouski, D.**, Postiglione, T., Deckert-Gaudig, T., Deckert, V., Lednev, I.K. (2013): Amide I vibrational mode suppression in surface (SERS) and tip (TERS) enhanced Raman spectra of protein specimens. *Analyst*, **138**, 1665-1673 (**made a journal cover**).
34. Srinivasan, S., Patke, S., Wang, Y., Ye, Z., Litt, J., Srivastava, S.K., Lopez, M.M., **Kurouski, D.**, Lednev, I.K., Kane, R.S., Colón, W. (2013): Pathogenic serum amyloid A 1.1 shows a long oligomer-rich fibrillation lag phase contrary to the highly amyloidogenic non-pathogenic SAA2.2. *J. Biol. Chem.*, **288**, 2744-2755.
35. Bhat, V., **Kurouski, D.**, Olenick, M.B., McDonald, C.B., Mikles, D.C., Deegan, B.J., Seldeen, K.L., Lednev, I.K., Farooq, A. (2012): Acidic pH promotes oligomerization

and membrane insertion of the BclXL apoptotic repressor. *Arch. Biochem. Biophys.*, **528**, 32-44.

36. **Kurouski, D.**, Dukor, R.K., Lu, X., Nafie, L.A., Lednev, I.K. (2012): Normal and reversed supramolecular chirality of insulin fibrils probed by vibrational circular dichroism at the protofilament level of fibril structure. *Biophys. J.*, **103**, 522-531.
37. **Kurouski, D.**, Deckert-Gaudig, T., Deckert, V., Lednev, I.K. (2012): Structure and composition of insulin fibril surfaces probed by TERS. *J. Am. Chem. Soc.*, **134**, 13323-13329.
38. **Kurouski, D.**, Washington, J., Ozbil, M., Prabhakar, R., Shekhtman, A., Lednev, I.K. (2012): Disulfide bridges remain intact while native insulin converts into amyloid fibrils. *PLoS One*, **7**, e36989.
39. **Kurouski, D.**, Luo, H., Sereda, V., Robb, F.T., Lednev, I.K. (2012): Rapid degradation kinetics of amyloid fibrils under mild conditions by an archaeal chaperonin. *Biochem. Biophys. Res. Commun.*, **422**, 97-102.
40. **Kurouski, D.**, Dukor, R.K., Lu, X., Nafie, L.A., Lednev, I.K. (2012): Spontaneous inter-conversion of insulin fibril chirality. *Chem. Commun.*, **48**, 2837-2839 (**made a journal cover**).
41. Heldt, C.L., **Kurouski, D.**, Sorci, M., Grafeld, E., Lednev, I.K., Belfort, G. (2011): Isolating toxic insulin amyloid reactive species that lack β -sheets and have wide pH stability. *Biophys. J.*, **100**, 2792-2800.
42. **Kurouski, D.**, Lednev, I.K. (2011): The impact of protein disulfide bonds on the amyloid fibril morphology. *Int. J. Biomed. Nanosci. Nanotech.*, **2**, 167-176.
43. **Kurouski, D.**, Lombardi, R.A., Dukor, R.K., Lednev, I.K., Nafie, L.A. (2010) Direct observation and pH control of reversed supramolecular chirality in insulin fibrils by vibrational circular dichroism. *Chem. Commun.* **46**, 7154-7156.
44. **Kurouski, D.**, Lauro, W., Lednev, I.K. (2010): Amyloid fibrils are "alive": spontaneous refolding from one polymorph to another. *Chem. Commun.*, **46**, 4249-4251 (**made a journal cover**).

SYNERGESTIC ACTIVITIES

Texas A&M University Department of Biochemistry and Biophysics Graduate Admissions Committee, 2017 – present.

Lead Organizer and Sponsor, Biophysical Chapter at Texas A&M University, 2017 – present.

Independent Reviewer for journals including: ACS Nano, Analyst, Journal of Physical Chemistry, ChemPhysChem, Sensors & Actuators.

FUNDING

Project Title	Organization	Award Dates	Amount
Robotic System for Intra-Canopy Acquisition of Phenotypic and Agronomic Data. <u>Kurouski (Co-PI)</u>	Crop Improvement Program, Texas A&M	11.01.2017-11.01.2019	\$41,818
Detection of plant characteristics including waxes, pathogens, volatiles. Development of libraries of chemical signatures of abiotic/biotic indicators of stress and new techniques and instruments for greenhouse/field management. <u>Kurouski (PI)</u>	Governor's University Research Initiative (GURI) and Chancellor's Research Initiative (CRI), Texas A&M	09.20.2017	\$86,000
Coupling of Raman Spectroscopy and Hydrogen Deuterium Exchange for the Fast, Confirmatory and Site-Specific Characterization of Conformational Changes in Proteins. <u>Kurouski (PI)</u>	Merck Pharmaceuticals	01.01.2018-12.31.2019	\$50,000