Curriculum Vitae, Soma Dhakal, Ph.D.

Virginia Commonwealth University
Department of Chemistry
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Richmond, VA 23284

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PROFESSIONAL EXPERIENCE

Assistant Professor — **Virginia Commonwealth University**, Richmond, VA (Aug. 2016–Present)

Postdoctoral Research Fellow — **University of Michigan**, Ann Arbor, MI (Feb. 2013–July 2016)
Advisor: Dr. Nils G. Walter

EDUCATION

Ph.D. — **Kent State University**, Kent, OH (Aug. 2007–Jan. 2013)
Department of Chemistry & Biochemistry
Advisor: Dr. Hanbin Mao
Thesis: *Mechanical stability evaluation of i-motif and G-quadruplex structures under diverse circumstances*

M. Sc. — **Tribhuvan University**, Nepal (2001–2003)
Central Department of Chemistry

B. Sc. — **Tribhuvan University**, Nepal (1998–2001)
Tri-Chandra Campus, Kathmandu

AWARDS & GRANTS

University Fellowship Award, Kent State University, Kent, OH (2010)

Graduate Student Senate (GSS) International Travel Grant, Kent State University, Kent, OH (2011)

PROFESSIONAL ACTIVITIES & MANUSCRIPT REVIEWER

Editorial Board Member, Jacobs Journal of Structural Chemistry (Since 2016)
Scientific Reports – Nature
Current Topics in Medicinal Chemistry

PUBLICATIONS

Peer-reviewed Research

1. Fu, J., Yang, YR. **Dhakal, S.** Zhao, Z., Zhang, T., Liu, M., Walter N.G. & Yan, H. (2016) DNA Nanostructure-Scaffolded Assembly of Multienzyme Complexes. *Nature Protocol*, 11; 2243-2273.

2. **Dhakal, S.** Adendorff, M., Liu, M., Yan, H., Bathe, M. & Walter N.G. (2016) Rational design of DNA-actuated enzyme nanoreactors guided by single molecule analysis. *Nanoscale*, 8**,** 3125-3137.

3. Zhao, Z., Fu, J., **Dhakal, S.**, Johnson-Buck, A., Liu, M., Zhang, T., Woodbury, N., Liu, Y., Walter, N.G. & Yan, H. (2016) Nano-caged enzymes with enhanced activity and stability. *Nature Communications*, 7, 10619.

4. Mallik, L.$^{\perp}$, **Dhakal, S.**$^{\perp}$, Nichols, J., Mahoney, J., Dosey, A. M., Jiang, S., Sunahara, R. K., Skiniotis, G. & Walter, N. G. (2015) Electron microscopic visualization of protein assemblies on flattened DNA origami**.** *ACS Nano* 9, 7133-7141. $^{\perp}$**Co-first author**

5. Shrestha, P., Xiao, S., **Dhakal, S.**, Tan, Z. & Mao, H. (2014) Nascent RNA transcripts facilitate the formation of G-quadruplexes. *Nucleic Acids Research* 11, 7236-7246.

6. Cui, Y., Koirala, D., Kang, H., **Dhakal, S**. Yangyuoru, P., Hurley, L.H. & Mao, H. (2014) Molecular population dynamics of RNA structures in a Bcl-2 promoter sequence is regulated by small-molecules and the transcription factor hnRNP LL. *Nucleic Acids Research* 42; 5755-5764.

7. **Dhakal**, **S.,** Cui, Y., Koirala, D., Ghimire, C., Kushwaha, S., Yu, Z., Yangyuoru, P. M. & Mao, H. (2013) Structural and mechanical properties of individual human telomeric G-quadruplexes in molecularly crowded solutions. *Nucleic Acids Research* 41, 3915–3923.

8. Yangyuoru, P. M., **Dhakal**, **S.**, Yu, Z., Koirala, D., Mwongela, S. M. & Mao, H. (2012) Single-molecule measurements of the binding between small molecules and DNA aptamers**.** *Analytical Chemistry* 84, 5298-5303.

9. **Dhakal**, **S**., Lafontaine, JL., Yu, Z., Koirala, D. & Mao, H. (2012) Intramolecular folding in human ILPR fragment with three C-rich repeats**.** *PLoS ONE* 7(6): e39271. doi:10.1371/journal.pone.0039271.

10. **Dhakal**, **S.**, Yu, Z., Konik, R., Cui, Y., Koirala, D. & Mao, H. (2012) G-quadruplex and i-motif are mutually exclusive in double stranded ILPR DNA. *Biophysical Journal* 102, 2575–2584.

11. Koirala, D., **Dhakal**, **S.**, Ashbridge, B., Sannohe, Y., Rodriguez, R., Sugiyama, H., Balasubramanian, S. & Mao. H. (2011) Single-Molecule Platform for Investigation of G-quadruplex and Ligand Interactions. *Nature Chemistry* 3, 782-787.

12. Koirala, D., Yu, Z., **Dhakal**, **S.** & Mao, H. (2011) Detection of single nucleotide polymorphism using tension dependent stochastic behavior of a single-molecule template. *J. Am. Chem. Soc.* 133, 9988–9991.

13. **Dhakal**, **S.**, Schonhoft, JD., Koirala, D., Yu, Z. Basu S. & Mao, H. (2010) Coexistence of an ILPR i-motif and a partially folded structure with comparable mechanical stability revealed at the single molecular level. *J. Am. Chem. Soc.* 132, 8991–8997.

14. Yu, Z., Schonhoft, JD., **Dhakal**, **S.**, Bajracharya, R., Hegde, R., Basu S. & Mao, H. (2009) ILPR G-quadruplexes formed in seconds demonstrate high mechanical stabilities. *J. Am. Chem. Soc.* 131, 1876–1882.

15. Schonhoft, JD., Bajracharya, R., **Dhakal**, **S.**, Yu, Z., Mao, H. & Basu S. (2009) Direct experimental evidence for quadruplex-quadruplex interaction within the human ILPR. *Nucleic Acids Research* 37, 3310–3320.

Reviews, Book Chapters, Conference Proceedings

Bartke, R. M., Cameron, E. L., Cristie-David, A. S., Custer, T. C., Denies, M. S., Daher, M., **Dhakal, S.** *et al*, (2014) Invited review meeting report: SMART timing—principles of single molecule techniques course at the University of Michigan 2014. *Biopolymers* 103.

Widom. JR., **Dhakal, S.,** Heinicke, LA., Walter, N. G. (2014) Single-molecule tools for enzymology, structural biology, systems biology and nanotechnology: an update. *Archives of toxicology* 88; 1965-1985.

Dhakal, S., Mao, H., Rajendran, A., Endo, M., Sugiyama, H., Eds: Spindler L, Spada G. P, Haider S, Silva M. W. D, Fritzsche W. (2012) "G-quadruplex nanostructures probed at the single molecular level by force-based methods" in guanine quartets: structure and application. *Royal Society of Chemistry Publishing*, UK.

Dhakal, **S.**, Yu, Z., Konik, R., Koirala, D. & Mao, H. (2011) Formation of human ILPR G-quadruplex in dsDNA. *International Review of Biophysical Chemistry* 2; N. 6.

CONFERENCE PRESENTATIONS

Research Talks

21st International Conference on DNA Computing and Molecular Programming
Harvard University, Massachusetts, August 2015

25-minute contributed talk on *Guiding systematic improvements of a DNA-actuated enzyme nanoreactor through single molecule analysis*

Biophysical Society 59th Annual Meeting
Baltimore, Maryland, February 2015
15-minute contributed talk on *Mechanical modulation of enzyme activity by rationally designed DNA tweezers: from the ensemble to the single-molecule level*

3rd International Meeting on G-quadruplex and G-assembly
Sorrento, Italy, June 2011
15-minute contributed talk on *Formation of human ILPR G-quadruplex in dsDNA*

Research Posters

Year-2 Review, Multidisciplinary University Research Initiative (MURI)
Arizona State University, Arizona, January 2015
Title: Guiding systematic improvements of a DNA-actuated enzyme nanoreactor through single molecule analysis

3rd Midwest Single Molecule Workshop
University of Illinois, Urbana-Champaign, August 2014
Title: Mechanical modulation of enzyme activity by dynamic DNA tweezers

Year-1 Review, Multidisciplinary University Research Initiative (MURI)
Arlington, Virginia, October 2013
Title: Spatially controlled DNA nanodevice: a promising tool for single-molecule detection of enzyme activity

Pittcon Conference
Philadelphia, Pensylvania, March 2013
Single-molecule measurements of the binding between small molecules and DNA aptamers

Second International Meeting on Quadruplex DNA
Camberley-Brown Hotel, Louisville, Kentucky, April 2009
Title: Equilibrium of parallel and antiparallel ILPR G-quadruplexes revealed by single molecule experiments

RESEARCH GROUP

Current Graduate Students:

Mr. Dalton Gibbs	Chemistry Student from Fall 2016
Ms. Anisa Kaur	Chemistry Student from Fall 2016

MENTORING EXPERIENCE

During Ph.D. and postdoctoral research, I have mentored a large number of undergraduate and graduate students including minority students, as well as students participating in summer research programs. Several of the students whom I mentored became co-authors on papers with me, and have carried on their projects quite successfully.

LEADERSHIP

Advisor
Nepalese Student Association
Virginia Commonwealth University, 2016 Aug- to date

Secretary
Nepalese Student Association
Kent State University, 2008-2009

Program Coordinator, Science Division
Kathmandu Model College
Kathmandu, Nepal, 2006 – 2007

SERVICE

Departmental Committee

Graduate Evaluation Committee (2016-2017)
Seminar Committee (2016-2017)

Other Departmental Service

Currently serving on 5 graduate student dissertation committees

TEACHING

Instructor—Spectrochemical Analysis (Chem 635), Fall 2016
Virginia Commonwealth University

Guest Lecture—Chemical Biology I (Chem 601), November 2, 2016
Virginia Commonwealth University

Instructor—Investigations in Chemistry (Chem 211), Fall 2015
University of Michigan

Substitute Lecture for Prof. Nils G. Walter, March 11, 2015
University of Michigan

Biological Chemistry (Biol Chem 451)

Teaching Assistant—Undergraduate Labs, 2008-2013
Kent State University
Analytical Chemistry I & II, General Chemistry I & II

Undergraduate Lab Development Fall 2008
Kent State University
Developed an experimental setup to measure Henry's law coefficient of toluene in water with gas chromatography-flame ionization detector (GC-FID) mass spectrometry

Instructor—Chemistry (Grade 11 & 12)
Kathmandu Model College, Kathmandu, Nepal, 2004-2006
Engineering Diploma, Tribhuvan University, Nepal, 2006-2007