

Arundhati Nag

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CURRENT POSITION

Assistant Professor, **Clarkson School of Chemistry and Biochemistry, Clark University**, Worcester, MA. 2017

- Research Interests: Chemical Biology, Peptide and protein science, Biomimetic catalysts and sensors

EDUCATION

Ph.D., **California Institute of Technology**, Pasadena, California. 2013
 Ph.D. in Chemistry.
 Thesis adviser: Professor James R. Heath, Division of Chemistry and Chemical Engineering
 Thesis: Developing peptide based capture agents for diagnostics and therapeutics.

M.Sc., **Indian Institute of Technology, Kanpur**, India. 2006
 Master of Science in Chemistry.
 Master's Project adviser: Professor Amalendu Chandra, Department of Chemistry.
 Project: Effects of ion concentration on the hydrogen bonded structure of water in the vicinity of ions in aqueous NaCl solutions.

B.Sc., **Presidency College, University of Calcutta**, India. 2004
 Bachelor of Science in Chemistry.

RESEARCH EXPERIENCE

Staff Scientist, **California Institute of Technology**, Pasadena, California. Mentors: *Professor James R. Heath and Professor Harry B. Gray.* 2014-2017

- Researching in vivo optimization of macrocyclic peptidomimetic reagent against activated oncogenic kinase, for imaging of carcinoma cells.
- Developing metallopeptide complexes as catalysts for renewable energy and exploring the mechanism of water oxidation catalysis by metallopeptidic complexes.

Postdoctoral Fellow, **California Institute of Technology**, Pasadena, California. 2013-2014
 Mentor: Professor James R. Heath.

- Developed and characterized novel macrocyclic reagent libraries, and developed sensors for detection of malarial biomarker proteins.

Graduate Research Assistant, **California Institute of Technology**, Pasadena, California. 2006-2013
 Mentor: Professor James R. Heath.

- Developed a technology for precise targeting of specific regions of proteins.

Masters Research fellow, **Indian Institute of Technology**, Kanpur, India. Mentor: Professor Amalendu Chandra. 2006

- Wrote Fortran program for exploring effects of ion concentration on the hydrogen bonded structure of water in aqueous NaCl solutions.

HONORS AND AWARDS

1. **Recipient, American Chemical Society Dan Su Travel Award**, May 2016.
Awarded to top four female applications for ACS Postdoc to Faculty (P2F) Workshop.
2. **National Finalist, NIH Director's Early Independence Award (EIA/DP5)**, May 2014.
Award supports exceptional young investigators who wish to pursue independent research directly after completion of their terminal doctoral/research degree or clinical residency.
3. **Nominee, Caltech for NIH Director's Early Independence Award**, December 2013. Two applicants chosen by Caltech as nominees.

PUBLICATIONS

Manuscript under preparation:

1. Nag, A., Das, S., Liu, Fan, Yu, M.B., Alvarez-Villalonga, B., Goddard, W., Heath, J.R. "A phospho-specific allosteric inhibitor of p-Akt2 enters cells via hydrophobic / hydrophilic switching.

Published articles:

2. Henning, R.K., Varghese, J.O., Das, S., Nag, A., Tang, G., Tang, K., Sutherland, A.M., Heath, J.R., Degradation of Akt Using Protein Catalyzed Capture Agents. *Journal of Peptide Science*, **2016**, 22, 196-200. doi: 10.1002/psc.2858
3. Das, S. #, Nag, A. #, Liang, J., Bunck, D. N., Umeda, A., Farrow, B., Coppock, M. B., Sarkes, D. A., Finch, A. S., Agnew, H. D., Pitram, S., Heath, J. R., A General Synthetic Approach for Designing Epitope Targeted Macrocyclic Peptide Ligands. *Angewandte Chemie International Edition* **2015**, 54(45), 13219–13224. doi:10.1002/anie.201505243 (#equal contribution)
4. Farrow, B., Wong, M., Malette, J., Lai, B., Deyle, K. M., Das, S., Nag, A., Agnew, H. D. and Heath, J. R., Epitope Targeting of Tertiary Protein Structure Enables Target-Guided Synthesis of a Potent In-Cell Inhibitor of Botulinum Neurotoxin. *Angewandte Chemie International Edition* **2015**, 54(24), 7114–7119. doi:10.1002/anie.201502451
5. Deyle, K.M., Farrow, B., Hee, Y.Q., Work, J., Wong, M., Lai, B., Umeda, A., Millward, S.W., Nag, A., Das, S. and Heath, J.R. Protein-targeting strategy used to develop a selective inhibitor of the E17K point mutation in the PH Domain of Akt1. *Nature Chemistry* **2015**, 7(5), 455-462. doi:10.1038/nchem.2223
6. Nag, A., Das, S., Yu, M. B., Deyle, K. M., Millward, S. W. and Heath, J. R., A Chemical Epitope-Targeting Strategy for Protein Capture Agents: The Serine 474 Epitope of the Kinase Akt2. *Angewandte Chemie International Edition* **2013**, 52(52), 13975–13979. doi:10.1002/anie.201305882
7. Millward, S.W., Agnew, H.D., Lai, B., Lee, S.S., Lim, J., Nag, A., Pitram, S., Rohde, R. and Heath, J.R., In situ click chemistry: from small molecule discovery to synthetic antibodies. *Integrative Biology* **2013**, 5 (1), 87-95. doi: 10.1039/c2ib20110k
8. Millward, S.W., Henning, R.K., Kwong, G.A., Pitram, S., Agnew, H.D., Deyle, K.M., Nag, A., Hein, J., Lee, S.S., Lim, J., Pfeilsticker, J.A., Sharpless, K.B., Heath, J.R. Iterative in situ click chemistry assembles a branched capture agent and allosteric inhibitor for Akt1. *Journal of the American*

Chemical Society **2011**, 133 (45), 18280-18288. doi:10.1021/ja2064389

9. Agnew, H.D., Rohde, R.D., Millward, S.W., Nag, A., Yeo, W.S., Hein, J.E., Pitram, S.M., Tariq, A.A., Burns, V.M., Krom, R.J. and Fokin, V.V. Sharpless, K.B., Heath, J.R., Iterative in situ click chemistry creates antibody-like protein-capture agents. *Angewandte Chemie International Edition* **2009**, *48* (27), 4944-4948. doi:10.1002/anie.200900488
10. Nag, A., Chakraborty, D., Chandra, A., Effects of ion concentration on the hydrogen bonded structure of water in the vicinity of ions in aqueous NaCl solutions. *Journal of Chemical Sciences* **2008**, *120*(1), 71-77. doi:10.1007/s12039-008-0009-0

PATENTS

1. Heath, J.R., Agnew, H., Farrow, B., Bunck, D., Liang, J., Nag, A., Das, S., Lai, B., Pitram, S., 2016. "Il-17f-specific capture agents, compositions, and methods of using and making" US 20170052199 A1.
2. Heath, J.R., Henning, R., Ram, A.N., Das, S., Nag, A." Cyclic peptide binder against oncogenic k-ras" US 20160264627 A1
3. Heath, J.R., Nag, A., Das, S., Deyle, K.M., Millward, S.W. and Kearney, P.E., Indi Molecular, Inc., 2016. *Akt-specific capture agents, compositions, and methods of using and making*. U.S. Patent 9,239,332.
4. Agnew, H., Rohde, R., Millward, S., Nag, A. and Heath, J.R., California Institute of Technology, 2015. *Capture agents and related compositions, methods and systems*. U.S. Patent 9,188,584.
5. Heath, J.R., Nag, A., Das, S., Varghese, J.O. and Henning, R.K., California Institute of Technology, 2014. *Phosphorylated akt-specific capture agents, compositions, and methods of using and making*. U.S. Patent Application 14/485,243.
6. Heath, J.R., Rohde, R.D., Nag, A., Das, S. and Umeda, A., California Institute of Technology, 2014. *Cyclic peptides as protein targeting agents*. U.S. Patent Application 14/310,201.

TEACHING AND MENTORING EXPERIENCES

University Teaching Experience:

1. **Instructor**, Biochemistry 271/371, Clark University 2017
2. **Instructor**, seminar "Navigating the American Classroom", Caltech Teaching Conference. *Taught and co-designed* the curriculum. 2016
3. **Completed**, with *distinction*, Center for the Integration of Research Teaching and Learning (CIRTL) network Massive Open Online Course (MOOC) "*Advancing Learning Through Evidence-Based STEM Teaching*". 2015- 2016
4. **Completed Certificate of Interest in University Teaching**, Caltech Project for Effective Teaching. Summer 2016
5. **Instructor**, one-day *workshop* "Protein Expression and Purification", Caltech, Pasadena, California. *Lectured, designed curriculum, co-instructed* laboratory component of workshop. Summer 2016

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| 6. Instructor , one-day <i>workshop</i> “Synthesis and Characterization of Peptides”,
<i>Caltech</i> , Pasadena, California. <i>Lectured, designed curriculum, co-instructed</i>
laboratory component of workshop. | 2016 |
| 7. Instructor , <i>10-week undergraduate course</i> “Treating traditionally
“untreatable” proteins in cancer therapy through protein therapeutics and
fragment based approaches”, <i>Caltech</i> , Pasadena, California. <i>Lectured,</i>
<i>designed curriculum.</i> | 2016 |
| 8. Graduate Teaching Assistant , <i>Caltech</i> , Pasadena, California. Teaching
Assistant for freshman chemistry and freshman chemistry laboratory course. | 2006-2007 |

Mentoring experience:

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| 9. Mentoring a graduate student and a senior undergraduate student at Clark
University. | 2017 |
| 10. As a post-doc and staff scientist, mentored <i>two graduate</i> students and <i>one</i>
<i>undergraduate</i> student at Caltech. | 2013- 2017 |
| 11. As a Ph.D. student, mentored <i>four undergraduate</i> students at Caltech,
several of whom have pursued Ph.D. and MD-Ph.D. programs. | 2006-2013 |

SELECTED TALKS AND POSTERS

Selected Talks:

1. Speaker, *Nanosystems Biology Cancer Center (NSBCC)*, National Cancer Institute site visit, 2016.
2. Speaker, *American Chemical Society Annual (Spring) Meeting*, 2016.
3. Speaker, *Point-of-Care Initiative* meeting, *Bill and Melinda Gates Foundation*, Seattle,
Washington, 2014.
4. Speaker, *UCLA-USC-Caltech Nanotechnology and Nanomedicine Symposium*, Los Angeles,
California, 2013.

Selected Posters:

1. Poster, *Gordon Conference on Chemistry and Biology of Peptides*, Ventura, California, 2016.
2. Poster, *Gordon Conference on Chemistry and Biology of Peptides*, Ventura, California, 2014.
3. Poster, *Gordon Conference on Chemistry and Biology of Peptides*, Ventura, California, 2012.
4. Poster, *Institute for Collaborative Biotechnologies (ICB) Army-Industry Collaboration* Conference,
Santa Barbara, California, 2011.

SERVICE ACTIVITIES

<i>Editorial activity</i>	Editorial board member, Journal of Medicinal Chemistry and Drug Design, Sciforschenonline.org
<i>Journal manuscript review</i>	Reviewer for <i>Physical Chemistry Chemical Physics</i> , <i>New Journal of</i> <i>Chemistry</i>
<i>Educational outreach</i>	Volunteer judge for undergraduate research seminar day.