

Stanford



Eric Kool

The George A. and Hilda M. Daubert Professor in Chemistry

CONTACT INFORMATION

- **Administrative Contact**

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Bio

BIO

Eric Kool received his Ph.D. in Chemistry from Columbia University and did postdoctoral work in nucleic acids chemistry at Caltech. He started his career at the University of Rochester before moving to Stanford in 1999, where he is the George and Hilda Daubert Professor of Chemistry. He teaches Organic Chemistry and Chemical Biology to undergraduate and graduate students.

The Kool lab uses the tools of chemistry to study the structures, interactions and biological activities of nucleic acids and the enzymes that process them. Molecular design and synthesis play a major role in this work, followed by analysis of structure and function, both in test tubes and in living systems. These studies are aimed at gaining a better basic understanding of biology, and applying this knowledge to practical applications in biomedicine.

As part of this research, members of the group synthesize designer nucleobases and nucleotides, with unusual properties such as fluorescence, enzyme reactivity, or altered shape and H-bonding ability. We use these as tools to study DNA polymerase enzymes, DNA repair pathways, and RNA modifying enzymes. This work is leading to new probes for diagnosis of cancer, useful fluorescent tags for biology, and fluorescent sensors of many species such as cancer metabolites and toxic metals.

ACADEMIC APPOINTMENTS

- Professor, Chemistry
- Member, Bio-X
- Member, Maternal & Child Health Research Institute (MCHRI)
- Member, Stanford Cancer Institute
- Faculty Fellow, Stanford ChEM-H
- Member, Wu Tsai Neurosciences Institute

HONORS AND AWARDS

- Breslow Award for Achievement in Biomimetic Chemistry, American Chemical Society (2015)
- O. K. Rice Lectureship, University of North Carolina (2015)
- Dean's Award for Distinguished Teaching, Stanford University (2014)

- Frontiers in Chemistry Distinguished Lecturer, Case Western Reserve University (2014)
- Tarrant Distinguished Lectureship, University of Florida (2014)
- O'Malley Lectureship, Boston College (2012)
- Tortellotte Lectureship, Kalamazoo College (2010)
- Hirschmann Lectureship, Oberlin College (2003)
- Novartis Lecturer, Massachusetts Institute of Technology (2003)
- Fellow of the AAAS, American Association for the Advancement of Science (2002)
- Bernard Belleau Memorial Lecturer, McGill University (2001)
- Dean's Award for Distinguished Teaching, Stanford University (2001)
- Arthur C. Cope Scholar Award, American Chemical Society (2000)
- Pfizer Award, American Chemical Society (2000)
- Alfred P. Sloan Foundation Fellow, Alfred P. Sloan Foundation (1994)
- American Cyanamid Faculty Award, American Cyanamid (1994)
- Army Young Investigator Award, Army Research Office (1993)
- Camille and Henry Dreyfus Teacher - Scholar Award, Camille and Henry Dreyfus Foundation (1993)
- Arnold & Mabel Beckman Foundation Young Investigator, Arnold & Mabel Beckman Foundation (1992)
- Office of Naval Research Young Investigator Award, Office of Naval Research (1992)

PROFESSIONAL EDUCATION

- PhD, Columbia University, Organic Chemistry, Biochemistry (1988)

LINKS

- My Lab Site: <http://www.stanford.edu/group/kool/>

Research & Scholarship

CURRENT RESEARCH AND SCHOLARLY INTERESTS

Our lab has a general interest in the design of small-molecule probes and reagents for the study of RNA and DNA in the cell, and of enzymes that modify them. For example, we are developing cell-permeable reagents that can be used to map structure and contacts of RNAs in living systems. We are also developing molecular tools for investigating RNA base modifications as well as DNA damage, and luminescence probes of the repair and epigenetic enzymes that process these structural alterations. We are using these tools to uncover new knowledge about the functions of noncoding RNAs in the cell, and are testing the potential of new anticancer targets.

Another major focus of our laboratory is the design, synthesis and study of unnatural DNA and RNA bases. These are used as tools for basic study of biochemical and biological mechanisms (see our work with "nonpolar isosteres"), and as the basis for a new designer genetic system ("xDNA").

One area in which we make extensive use of designer DNA bases is in "DNA polyfluors", which are short segments of synthetic DNA in which the bases are replaced by fluorescent structures. These have been developed into a large palette of fluorescent labels for biology, offering benefits that current fluorescent labels do not have. They are also being built into chemosensors: for example, they are used in arrays of fluorescent DNAs that can "smell" the metabolites that different bacteria emit, allowing us to distinguish disease-causing bacteria in a Petri dish. Our lab is also designing a broad array of multicolor sensors for different classes of enzymes, from esterases to proteases and DNA repair enzymes. These can function in living cells to report on biological activities there.

A second project that makes extensive use of designer DNA bases is our design of an alternative genetic set based on expanded size (“xDNA”). This eight-letter genetic set has high information content and is orthogonal to the natural DNA system. We have shown that xDNA assembles into helices selectively, much like DNA, except that it is more stable and is also brightly fluorescent. We have found polymerase enzymes that can copy bases of xDNA, and have shown that E. coli replication machinery can read the genetic information stored in xDNA. Very recently, we have begun to synthesize and study xRNA as well.

Teaching

COURSES

2019-20

- Organic Polyfunctional Compounds: CHEM 123 (Aut)
- Synthesis and Analysis at the Chemistry-Biology Interface: CHEM 283 (Spr)

2018-19

- Organic Polyfunctional Compounds: CHEM 131 (Aut)
- Synthesis and Analysis at the Chemistry-Biology Interface: CHEM 226 (Win)

2017-18

- Synthesis and Analysis at the Chemistry-Biology Interface: CHEM 226 (Win)

2016-17

- Organic Polyfunctional Compounds: CHEM 131 (Aut, Win)

STANFORD ADVISEES

Doctoral Dissertation Reader (AC)

Zixin Chen, Kayvon Pedram, Sam Schneider, Jessica Su, Josh Visser

Postdoctoral Faculty Sponsor

Yong Woong Jun, Lu Xiao, Ruyi Zhu

Doctoral Dissertation Advisor (AC)

Sayantana Chatterjee, Edward Gao, Yujeong Lee, Michael Mohsen, Hyun Shin Park, David Wilson

GRADUATE AND FELLOWSHIP PROGRAM AFFILIATIONS

- Biophysics (Phd Program)

Publications

PUBLICATIONS

- **Simple alkanoyl acylating agents for reversible RNA functionalization and control** *CHEMICAL COMMUNICATIONS*
Park, H., Kietrys, A. M., Kool, E. T.
2019; 55 (35): 5135–38
- **Simple alkanoyl acylating agents for reversible RNA functionalization and control.** *Chemical communications (Cambridge, England)*
Park, H. S., Kietrys, A. M., Kool, E. T.
2019
- **RNA structure maps across mammalian cellular compartments** *NATURE STRUCTURAL & MOLECULAR BIOLOGY*
Sun, L., Fazal, F. M., Li, P., Broughton, J. P., Lee, B., Tang, L., Huang, W., Kool, E. T., Chang, H. Y., Zhang, Q.
2019; 26 (4): 322-+
- **Polymerase-amplified release of ATP (POLARA) for detecting single nucleotide variants in RNA and DNA** *CHEMICAL SCIENCE*

- Mohsen, M. G., Ji, D., Kool, E. T.
2019; 10 (11): 3264–70
- **RNA structure maps across mammalian cellular compartments.** *Nature structural & molecular biology*
Sun, L., Fazal, F. M., Li, P., Broughton, J. P., Lee, B., Tang, L., Huang, W., Kool, E. T., Chang, H. Y., Zhang, Q. C.
2019
 - **Fluorescent reporter assays provide direct, accurate, quantitative measurements of MGMT status in human cells.** *PLoS one*
Nagel, Z. D., Beharry, A. A., Mazzucato, P., Kitange, G. J., Sarkaria, J. N., Kool, E. T., Samson, L. D.
2019; 14 (2): e0208341
 - **Polymerase-amplified release of ATP (POLARA) for detecting single nucleotide variants in RNA and DNA.** *Chemical science*
Mohsen, M. G., Ji, D., Kool, E. T.
2019; 10 (11): 3264–70
 - **Water-Soluble Leaving Group Enables Hydrophobic Functionalization of RNA.** *Organic letters*
Velema, W. A., Kool, E. T.
2018
 - **Fluorescence Probes of ALKBH2 Measure DNA Alkylation Repair and Drug Resistance Responses.** *Angewandte Chemie (International ed. in English)*
Wilson, D. L., Beharry, A. A., Srivastava, A., O'Connor, T. R., Kool, E. T.
2018
 - **Exceptionally rapid oxime and hydrazone formation promoted by catalytic amine buffers with low toxicity** *CHEMICAL SCIENCE*
Larsen, D., Kietrys, A. M., Clark, S. A., Park, H., Ekebergh, A., Kool, E. T.
2018; 9 (23): 5252–59
 - **Aldehyde dehydrogenase 3A1 activation prevents radiation-induced xerostomia by protecting salivary stem cells from toxic aldehydes.** *Proceedings of the National Academy of Sciences of the United States of America*
Saiki, J. P., Cao, H., Van Wassenhove, L. D., Viswanathan, V., Bloomstein, J., Nambiar, D. K., Mattingly, A. J., Jiang, D., Chen, C., Stevens, M. C., Simmons, A. L., Park, H. S., von Eyben, et al
2018
 - **ATP-Linked Chimeric Nucleotide as a Specific Luminescence Reporter of Deoxyuridine Triphosphatase** *BIOCONJUGATE CHEMISTRY*
Ji, D., Kietrys, A. M., Lee, Y., Kool, E. T.
2018; 29 (5): 1614–21
 - **Development of highly potent and selective inhibitors of DNA repair by 8-oxoguanine DNA glycosylase (OGG1)**
Tahara, Y., Kool, E.
AMER CHEMICAL SOC.2018
 - **RNA Control by Photoreversible Acylation** *JOURNAL OF THE AMERICAN CHEMICAL SOCIETY*
Velema, W. A., Kietrys, A. M., Kool, E. T.
2018; 140 (10): 3491–95
 - **RNA Cloaking by Reversible Acylation** *ANGEWANDTE CHEMIE-INTERNATIONAL EDITION*
Kadina, A., Kietrys, A. M., Kool, E. T.
2018; 57 (12): 3059–63
 - **Potent and Selective Inhibitors of 8-Oxoguanine DNA Glycosylase** *JOURNAL OF THE AMERICAN CHEMICAL SOCIETY*
Tahara, Y., Auld, D., Ji, D., Beharry, A. A., Kietrys, A. M., Wilson, D. L., Jimenez, M., King, D., Nguyen, Z., Kool, E. T.
2018; 140 (6): 2105–14
 - **Exceptionally rapid oxime and hydrazone formation promoted by catalytic amine buffers with low toxicity.** *Chemical science*
Larsen, D., Kietrys, A. M., Clark, S. A., Park, H. S., Ekebergh, A., Kool, E. T.
2018; 9 (23): 5252–59
 - **Fluorescent Probes of DNA Repair.** *ACS chemical biology*
Wilson, D. L., Kool, E. T.
2017

- **Fingerprints of Modified RNA Bases from Deep Sequencing Profiles** *JOURNAL OF THE AMERICAN CHEMICAL SOCIETY*
Kietrys, A. M., Velema, W. A., Kool, E. T.
2017; 139 (47): 17074–81
- **Measuring deaminated nucleotide surveillance enzyme ITPA activity with an ATP-releasing nucleotide chimera** *NUCLEIC ACIDS RESEARCH*
Ji, D., Stepchenkova, E. I., Cui, J., Menezes, M. R., Pavlov, Y. I., Kool, E. T.
2017; 45 (20): 11515–24
- **Color-Change Photoswitching of an Alkynylpyrene Excimer Dye** *ANGEWANDTE CHEMIE-INTERNATIONAL EDITION*
Chan, K. M., Kolmel, D. K., Wang, S., Kool, E. T.
2017; 56 (23): 6497-6501
- **Fluorogenic Templated Reaction Cascades for RNA Detection** *JOURNAL OF THE AMERICAN CHEMICAL SOCIETY*
Velema, W. A., Kool, E. T.
2017; 139 (15): 5405-5411
- **DNA as an environmental sensor: detection and identification of pesticide contaminants in water with fluorescent nucleobases.** *Organic & biomolecular chemistry*
Kwon, H., Chan, K. M., Kool, E. T.
2017; 15 (8): 1801-1809
- **Comparison of SHAPE reagents for mapping RNA structures inside living cells** *RNA*
Lee, B., Flynn, R. A., Kadina, A., Guo, J. K., Kool, E. T., Chang, H. Y.
2017; 23 (2): 169-174
- **Chemical and structural effects of base modifications in messenger RNA.** *Nature*
Harcourt, E. M., Kietrys, A. M., Kool, E. T.
2017; 541 (7637): 339-346
- **Oximes and Hydrazones in Bioconjugation: Mechanism and Catalysis.** *Chemical reviews*
Kölmel, D. K., Kool, E. T.
2017; 117 (15): 10358–76
- **Luminescent Carbon Dot Mimics Assembled on DNA.** *Journal of the American Chemical Society*
Chan, K. M., Xu, W., Kwon, H., Kietrys, A. M., Kool, E. T.
2017; 139 (37): 13147–55
- **Fluorescent nucleobases as tools for studying DNA and RNA.** *Nature chemistry*
Xu, W., Chan, K. M., Kool, E. T.
2017; 9 (11): 1043–55
- **Fluorescent nucleobases as tools for studying DNA and RNA** *Nature Chemistry*
Xu, W., Chan, K., Kool, E. T.
2017; 9: 1043–1055
- **Luminescent Carbon Dot Mimics Assembled on DNA** *Journal of the American Chemical Society*
Chan, K., Xu, W., Kwon, H., Kietrys, A. M., Kool, E. T.
2017; 139 (37): 13147–13155
- **Light-Up "Channel Dyes" for Haloalkane-Based Protein Labeling in Vitro and in Bacterial Cells** *BIOCONJUGATE CHEMISTRY*
Clark, S. A., Singh, V., Mendoza, D. V., Margolin, W., Kool, E. T.
2016; 27 (12): 2839-2843
- **DNA polymerase ? specializes in incorporating synthetic expanded-size (xDNA) nucleotides.** *Nucleic acids research*
Kent, T., Rusanov, T. D., Hoang, T. M., Velema, W. A., Krueger, A. T., Copeland, W. C., Kool, E. T., Pomerantz, R. T.
2016; 44 (19): 9381-9392
- **The Discovery of Rolling Circle Amplification and Rolling Circle Transcription.** *Accounts of chemical research*
Mohsen, M. G., Kool, E. T.
2016: -?

- **Dark Hydrazone Fluorescence Labeling Agents Enable Imaging of Cellular Aldehydic Load.** *ACS chemical biology*
Yuen, L. H., Saxena, N. S., Park, H. S., Weinberg, K., Kool, E. T.
2016; 11 (8): 2312-2319
- **A Chimeric ATP-Linked Nucleotide Enables Luminescence Signaling of Damage Surveillance by MTH1, a Cancer Target.** *Journal of the American Chemical Society*
Ji, D., Beharry, A. A., Ford, J. M., Kool, E. T.
2016; 138 (29): 9005-9008
- **Efficient synthesis of fluorescent alkynyl C-nucleosides via Sonogashira coupling for the preparation of DNA-based polyfluorophores.** *Organic & biomolecular chemistry*
Kölmel, D. K., Barandun, L. J., Kool, E. T.
2016; 14 (27): 6407-6412
- **Functional interplay between NTP leaving group and base pair recognition during RNA polymerase II nucleotide incorporation revealed by methylene substitution** *NUCLEIC ACIDS RESEARCH*
Hwang, C. S., Xu, L., Wang, W., Ulrich, S., Zhang, L., Chong, J., Shin, J. h., Huang, X., Kool, E. T., McKenna, C. E., Wang, D.
2016; 44 (8): 3820-3828
- **Kinetic selection vs. free energy of DNA base pairing in control of polymerase fidelity** *PROCEEDINGS OF THE NATIONAL ACADEMY OF SCIENCES OF THE UNITED STATES OF AMERICA*
Oertell, K., Harcourt, E. M., Mohsen, M. G., Petruska, J., Kool, E. T., Goodman, M. F.
2016; 113 (16): E2277-E2285
- **Fluorogenic Real-Time Reporters of DNA Repair by MGMT, a Clinical Predictor of Antitumor Drug Response** *PLOS ONE*
Beharry, A. A., Nagel, Z. D., Samson, L. D., Kool, E. T.
2016; 11 (4)
- **Fluorescence Monitoring of the Oxidative Repair of DNA Alkylation Damage by ALKBH3, a Prostate Cancer Marker.** *Journal of the American Chemical Society*
Beharry, A. A., Lacoste, S., O'Connor, T. R., Kool, E. T.
2016; 138 (11): 3647-3650
- **Fluorescence Monitoring of the Oxidative Repair of DNA Alkylation Damage by ALKBH3, a Prostate Cancer Marker** *JOURNAL OF THE AMERICAN CHEMICAL SOCIETY*
Beharry, A. A., Lacoste, S., O'Connor, T. R., Kool, E. T.
2016; 138 (11): 3647-3650
- **7SK-BAF axis controls pervasive transcription at enhancers.** *Nature structural & molecular biology*
Flynn, R. A., Do, B. T., Rubin, A. J., Calo, E., Lee, B., Kuchelmeister, H., Rale, M., Chu, C., Kool, E. T., Wysocka, J., Khavari, P. A., Chang, H. Y.
2016; 23 (3): 231-238
- **ATP-Releasing Nucleotides: Linking DNA Synthesis to Luciferase Signaling.** *Angewandte Chemie (International ed. in English)*
Ji, D., Mohsen, M. G., Harcourt, E. M., Kool, E. T.
2016; 55 (6): 2087-2091
- **Fluorogenic Real-Time Reporters of DNA Repair by MGMT, a Clinical Predictor of Antitumor Drug Response.** *PloS one*
Beharry, A. A., Nagel, Z. D., Samson, L. D., Kool, E. T.
2016; 11 (4)
- **Epigenetics: A new methyl mark on messengers.** *Nature*
Kietrys, A. M., Kool, E. T.
2016; 530 (7591): 423-24
- **Organocatalytic removal of formaldehyde adducts from RNA and DNA bases** *NATURE CHEMISTRY*
Karmakar, S., Harcourt, E. M., Hewings, D. S., Lovejoy, A. F., Kurtz, D. M., Ehrenschrwender, T., Barandun, L. J., Roost, C., Alizadeh, A. A., Kool, E. T.
2015; 7 (9): 752-758
- **Organocatalytic removal of formaldehyde adducts from RNA and DNA bases.** *Nature chemistry*
Karmakar, S., Harcourt, E. M., Hewings, D. S., Scherer, F., Lovejoy, A. F., Kurtz, D. M., Ehrenschrwender, T., Barandun, L. J., Roost, C., Alizadeh, A. A., Kool, E. T.

2015; 7 (9): 752-758

- **In Vitro Fluorogenic Real-Time Assay of the Repair of Oxidative DNA Damage** *CHEMBIOCHEM*
Edwards, S. K., Ono, T., Wang, S., Jiang, W., Franzini, R. M., Jung, J. W., Chan, K. M., Kool, E. T.
2015; 16 (11): 1637-1646
- **Structural imprints in vivo decode RNA regulatory mechanisms.** *Nature*
Spitale, R. C., Flynn, R. A., Zhang, Q. C., Crisalli, P., Lee, B., Jung, J., Kuchelmeister, H. Y., Batista, P. J., Torre, E. A., Kool, E. T., Chang, H. Y.
2015; 519 (7544): 486-490
- **Structural imprints in vivo decode RNA regulatory mechanisms** *NATURE*
Spitale, R. C., Flynn, R. A., Zhang, Q. C., Crisalli, P., Lee, B., Jung, J., Kuchelmeister, H. Y., Batista, P. J., Torre, E. A., Kool, E. T., Chang, H. Y.
2015; 519 (7544): 486-?
- **Structure and Thermodynamics of N-6-Methyladenosine in RNA: A Spring-Loaded Base Modification** *JOURNAL OF THE AMERICAN CHEMICAL SOCIETY*
Roost, C., Lynch, S. R., Batista, P. J., Qu, K., Chang, H. Y., Kool, E. T.
2015; 137 (5): 2107-2115
- **New Organocatalyst Scaffolds with High Activity in Promoting Hydrazone and Oxime Formation at Neutral pH.** *Organic letters*
Larsen, D., Pittelkow, M., Karmakar, S., Kool, E. T.
2015; 17 (2): 274-277
- **Pattern-Based Detection of Anion Pollutants in Water with DNA Polyfluorophores** *CHEMICAL SCIENCE*
Kwon, H., Jei, W., Kool, E. T.
2015; 6: 2575-2583
- **In Vitro Fluorogenic Real-Time Assay of the Repair of Oxidative DNA Damage.** *Chembiochem : a European journal of chemical biology*
Edwards, S. K., Ono, T., Wang, S., Jiang, W., Franzini, R. M., Jung, J. W., Chan, K. M., Kool, E. T.
2015; 16 (11): 1637-46
- **Pattern-Based Detection of Anion Pollutants in Water with DNA Polyfluorophores.** *Chemical science*
Kwon, H., Jiang, W., Kool, E. T.
2015; 6 (4): 2575-83
- **Correction: Pattern-based detection of anion pollutants in water with DNA polyfluorophores.** *Chemical science*
Kwon, H., Jiang, W., Kool, E. T.
2015; 6 (8): 5086
- **Pattern-based detection of anion pollutants in water with DNA polyfluorophores** *CHEMICAL SCIENCE*
Kwon, H., Jiang, W., Kool, E. T.
2015; 6 (4): 2575-2583
- **Structure and Thermodynamics of N6-Methyladenosine in RNA: A Spring-Loaded Base Modification** *Journal of American Chemical Society*
Roost, C., Lynch, S. M., Batista, P. J., Qu, K., Chang, H. Y., Kool, E. T.
2015; 137: 2107-2115
- **RNA structural analysis by evolving SHAPE chemistry** *WILEY INTERDISCIPLINARY REVIEWS-RNA*
Spitale, R. C., Flynn, R. A., Torre, E. A., Kool, E. T., Chang, H. Y.
2014; 5 (6): 867-881
- **RNA structural analysis by evolving SHAPE chemistry.** *Wiley interdisciplinary reviews. RNA*
Spitale, R. C., Flynn, R. A., Torre, E. A., Kool, E. T., Chang, H. Y.
2014; 5 (6): 867-881
- **Large-Scale Detection of Metals with a Small Set of Fluorescent DNA-Like Chemosensors** *JOURNAL OF THE AMERICAN CHEMICAL SOCIETY*
Yuen, L. H., Franzini, R. M., Tan, S. S., Kool, E. T.
2014; 136 (41): 14576-14582
- **Molecular basis of transcriptional fidelity and DNA lesion-induced transcriptional mutagenesis.** *DNA repair*
Xu, L., Da, L., Plouffe, S. W., Chong, J., Kool, E., Wang, D.

2014; 19: 71-83

- **Molecular basis of transcriptional fidelity and DNA lesion-induced transcriptional mutagenesis** *DNA REPAIR*
Xu, L., Da, L., Plouffe, S. W., Chong, J., Kool, E., Wang, D.
2014; 19: 71-83
- **Pattern-based detection of toxic metals in surface water with DNA polyfluorophores.** *Angewandte Chemie (International ed. in English)*
Yuen, L. H., Franzini, R. M., Wang, S., Crisalli, P., Singh, V., Jiang, W., Kool, E. T.
2014; 53 (21): 5361-5365
- **Dissecting the chemical interactions and substrate structural signatures governing RNA polymerase II trigger loop closure by synthetic nucleic acid analogues.** *Nucleic acids research*
Xu, L., Butler, K. V., Chong, J., Wengel, J., Kool, E. T., Wang, D.
2014; 42 (9): 5863-5870
- **Fast Alpha Nucleophiles: Structures that Undergo Rapid Hydrazone/Oxime Formation at Neutral pH** *ORGANIC LETTERS*
Kool, E. T., Crisalli, P., Chan, K. M.
2014; 16 (5): 1454-1457
- **Designer bases, base pairs, and genetic sets: biochemical and biological activity, in Synthetic Biology: Volume 1, 2014, 1, pp. 1-30** *Synthetic Biology*
Harcourt, E. M., Kool, E. T.
Royal Society of Chemistry.2014: 1-30
- **Large-scale Detection of Metals with a Small Number of DNA-like Fluorescent Chemosensors** *Journal of the American Chemical Society*
Yuen, L. H., Franzini, R. M., Tan, S. S., Kool, E. T.
2014
- **Identification of a Selective Polymerase Enables Detection of N-6-Methyladenosine in RNA** *JOURNAL OF THE AMERICAN CHEMICAL SOCIETY*
Harcourt, E. M., Ehrenschrwender, T., Batista, P. J., Chang, H. Y., Kool, E. T.
2013; 135 (51): 19079-19082
- **Fast Hydrazone Reactants: Electronic and Acid/Base Effects Strongly Influence Rate at Biological pH** *JOURNAL OF THE AMERICAN CHEMICAL SOCIETY*
Kool, E. T., Park, D., Crisalli, P.
2013; 135 (47): 17663-17666
- **Artificial Genetic Sets Composed of Size-Expanded Base Pairs** *ANGEWANDTE CHEMIE-INTERNATIONAL EDITION*
Winnacker, M., Kool, E. T.
2013; 52 (48): 12498-12508
- **Monitoring eukaryotic and bacterial UDG repair activity with DNA-multifluorophore sensors.** *Nucleic acids research*
Ono, T., Edwards, S. K., Wang, S., Jiang, W., Kool, E. T.
2013; 41 (12)
- **Monitoring eukaryotic and bacterial UDG repair activity with DNA-multifluorophore sensors** *NUCLEIC ACIDS RESEARCH*
Ono, T., Edwards, S. K., Wang, S., Jiang, W., Kool, E. T.
2013; 41 (12)
- **Genetically encoded multispectral labeling of proteins with polyfluorophores on a DNA backbone.** *Journal of the American Chemical Society*
Singh, V., Wang, S., Kool, E. T.
2013; 135 (16): 6184-6191
- **Importance of ortho proton donors in catalysis of hydrazone formation.** *Organic letters*
Crisalli, P., Kool, E. T.
2013; 15 (7): 1646-1649
- **Selective Fluorogenic Chemosensors for Distinct Classes of Nucleases** *CHEMBIOCHEM*
Jung, J., Edwards, S. K., Kool, E. T.
2013; 14 (4): 440-444
- **Water-Soluble Organocatalysts for Hydrazone and Oxime Formation** *JOURNAL OF ORGANIC CHEMISTRY*

- Crisalli, P., Kool, E. T.
2013; 78 (3): 1184-1189
- **DNA-polyfluorophore chemosensors for environmental remediation: vapor-phase identification of petroleum products in contaminated soil** *CHEMICAL SCIENCE*
Jiang, W., Wang, S., Yuen, L. H., Kwon, H., Ono, T., Kool, E. T.
2013; 4 (8): 3184-3190
 - **DNA-polyfluorophore Chemosensors for Environmental Remediation: Vapor-phase Identification of Petroleum Products in Contaminated Soil.** *Chemical science (Royal Society of Chemistry : 2010)*
Jiang, W., Wang, S., Yuen, L. H., Kwon, H., Ono, T., Kool, E. T.
2013; 4 (8): 3184-90
 - **Chemical fidelity of an RNA polymerase ribozyme** *CHEMICAL SCIENCE*
Attwater, J., Tagami, S., Kimoto, M., Butler, K., Kool, E. T., Wengel, J., Herdewijn, P., Hirao, I., Holliger, P.
2013; 4 (7): 2804-2814
 - **RNA SHAPE analysis in living cells** *NATURE CHEMICAL BIOLOGY*
Spitale, R. C., Crisalli, P., Flynn, R. A., Torre, E. A., Kool, E. T., Chang, H. Y.
2013; 9 (1): 18-?
 - **RNA SHAPE analysis in living cells.** *Nature chemical biology*
Spitale, R. C., Crisalli, P., Flynn, R. A., Torre, E. A., Kool, E. T., Chang, H. Y.
2013; 9 (1): 18-20
 - **Fluorescence Quenchers for Hydrazone and Oxime Orthogonal Bioconjugation** *BIOCONJUGATE CHEMISTRY*
Crisalli, P., Hernandez, A. R., Kool, E. T.
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 - **Steric Restrictions of RISC in RNA Interference Identified with Size-Expanded RNA Nucleobases** *ACS CHEMICAL BIOLOGY*
Hernandez, A. R., Peterson, L. W., Kool, E. T.
2012; 7 (8): 1454-1461
 - **DNA-Multichromophore Systems** *CHEMICAL REVIEWS*
Teo, Y. N., Kool, E. T.
2012; 112 (7): 4221-4245
 - **Dissecting Chemical Interactions Governing RNA Polymerase II Transcriptional Fidelity** *JOURNAL OF THE AMERICAN CHEMICAL SOCIETY*
Kellinger, M. W., Ulrich, S., Chong, J., Kool, E. T., Wang, D.
2012; 134 (19): 8231-8240
 - **Amplified microRNA detection by templated chemistry** *NUCLEIC ACIDS RESEARCH*
Harcourt, E. M., Kool, E. T.
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