Dennis Bong **Curriculum Vitae**

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a. Appointments

Assistant Professor, Chemistry Department, The Ohio State University (2004-2012)
Associate Professor, Chemistry & Biochemistry Department, The Ohio State University (2012-present)

b. Education/Training

INSTITUTION	MENTOR	DEGREE	YEARS	FIELD
University of California, Berkeley	K. Peter C. Vollhardt	B.Sc.	1991-1994	Chemistry
The Scripps Research Institute	M. Reza Ghadiri	Ph.D.	1995-2001	Chemistry
Columbia University	Ronald Breslow	postdoctoral	2001-2004	Chemistry

c. Professional Memberships

1999-present American Chemical Society
2006-present Biophysical Society

d. Research Interests

We are pursuing chemical strategies to direct molecular recognition using polymer, peptide and lipid platforms with the goal of addressing biomedically relevant problems in delivery and signaling. An early research goal was to determine the biophysical underpinnings of the noncovalent reactions of lipid assemblies, such as membrane fusion and switching of lipid phase morphology. We designed two different membrane fusion systems based on small molecule recognition that selectively merge vesicular populations, the first demonstration of this in the literature. Based on these concepts, we created lipid carrier systems that effectively prevent membrane fusion, allowing the preparation of novel lipid-based drug formulations that are exhibit particle stability over a wide range of hydration as well as stability in serum. This work on lipid recognition led directly to development of a oligonucleotide mimics we term bifacial peptide nucleic acid (bPNA). We are using bPNA as a tool to noncovalently modify nucleic acids with prosthetic groups to expand the chemical functionality available to aptamer scaffolds. Using an approach grounded in fundamental molecular recognition studies, we are exploring the utility of bPNA nucleic acid complexes in diagnostics, delivery and protein interface targeting. This work has potential biomedical impact as a novel therapeutic and analytical method, as well as relevance to origins of life.

e. Independent Publications

23. Zhou, Z., Xia, X., Green, D. & Bong, D.* High capacity drug carriers from common polymer amphiphiles. *submitted*
22. Zhou, Z., Xia, X. & Bong, D.* "Synthetic polymer hybridization with DNA and RNA directs nanoparticle loading, silencing delivery, and aptamer function." *J. Am. Chem. Soc.* **137**, 8920-8923 (2015).
21. Mao, J. & Bong, D.* DNA-binding Peptoids. *Synlett* **26**, 1581-1585 (2015). (Special issue dedicated to K. Peter C. Vollhardt).
20. Piao, X., Xia, X., Mao J. & Bong, D. Peptide ligation and RNA cleavage via an abiotic template interface. *J. Am. Chem. Soc.* **137**, 3551-3754 (2015).
19. Xia, X., Piao, X. & Bong, D. Bifacial peptide nucleic acid as an allosteric switch for aptamer and ribozyme function. *J. Am. Chem. Soc.* **136,** 7265–7268 (2014).
18. Ma, M. & Bong, D. Controlled Fusion of Synthetic Lipid Membrane Vesicles. *Acc. Chem. Res.* **46**, 2988-2997 (2013).
17. Xia, X., Piao, X., Fredrick, K. & Bong, D. Bifacial PNA complexation inhibits enzymatic access to DNA and RNA. *ChemBioChem* **15**, 31-36 (2013).
16. Piao, X., Xia, X. & Bong, D. Bifacial Peptide Nucleic Acid Directs Cooperative Folding and Assembly of Binary, Ternary, and Quaternary DNA Complexes. *Biochemistry* **52**, 6313-6323 (2013).
15. Zhou, Z. & Bong, D. Small-Molecule/Polymer Recognition Triggers Aqueous-Phase Assembly and Encapsulation. *Langmuir* **29**, 144-150 (2013).
14. Bandyopadhyay, S., Xia, X., Matseiyeu, A., Mihai, G., Rajagopalan, S. & Bong, D. Z-Group Ketone Chain Transfer Agents for RAFT Polymer Nanoparticle Modification via Hydrazone Conjugation. *Macromolecules* **45**, 6766-6773 (2012).

13. Zeng, Y., Pratumyot, Y., Piao, X. & Bong, D. Discrete assembly of synthetic peptide-DNA triplex structures from polyvalent melamine-thymine bifacial recognition. *J. Am. Chem. Soc.* **134**, 832-835 (2012).
12. Ma, M & Bong, D. Protein assembly directed by synthetic molecular recognition motifs. *Org. Biomol. Chem.* **9**, 7296-7299 (2011).
11. Bandyopadhyay, S. & Bong, D. Synthesis of Trifunctional Phosphatidylserine Probes for Identification of Lipid-Binding Proteins. *Eur. J. Org. Chem.* **2011**, 751-758 (2011).
10. Bhattacharjee, S. & Bong, D. Protein-Polymer Grafts via a Soy Protein Derived Macro-RAFT Chain Transfer Agent. *J. Polym. Env.* **19**, 203-208 (2011).
9. Ma, M., Chatterjee, S., Zhang, M. & Bong, D. Stabilization of vesicular and supported membranes by glycolipid oxime polymers. *Chem. Commun.* **47**, 2853-2855 (2011).
8. Ma, M. & Bong, D. Directed Peptide Assembly at the Lipid-Water Interface Cooperatively Enhances Membrane Binding and Activity. *Langmuir* **27**, 1480-1486 (2011).
7. Ma, M. & Bong, D. Determinants of Cyanuric Acid and Melamine Assembly in Water. *Langmuir* **27**, 8841-8853 (2011).
6. Torres, O. & Bong, D. Determinants of Membrane Activity from Mutational Analysis of the HIV Fusion Peptide. *Biochemistry* **50**, 5195-5207 (2011).
5. Ma, M., Gong, Y. & Bong, D. Lipid Membrane Adhesion and Fusion Driven by Designed, Minimally Multivalent Hydrogen-Bonding Lipids. *J. Am. Chem. Soc.* **131**, 16919-16926 (2009).
4. Gong, Y., Ma, M., Luo, Y. & Bong, D. Functional determinants of a synthetic vesicle fusion system. *J. Am. Chem. Soc.* **130**, 6196-6205 (2008).
3. Ma, M., Paredes, A. & Bong, D. Intra- and intermembrane pairwise molecular recognition between synthetic hydrogen-bonding phospholipids. *J. Am. Chem. Soc.* **130**, 14456-14458 (2008).
2. Torres, O., Yuksel, D., Bernardina, M., Kumar, K. & Bong, D. Peptide tertiary structure nucleation by side-chain crosslinking with metal complexation and double "click" cycloaddition. *ChemBioChem* **9**, 1701-1705 (2008).
1. Gong, Y., Luo, Y. & Bong, D. Membrane activation: selective vesicle fusion via small molecule recognition. *J. Am. Chem. Soc.* **128**, 14430-14431 (2006).

f. Patents/Inventions

Inventor: Dennis Bong. "Membrane stabilizing composition and methods." Provisional patent filed February 25, 2010, renewed February 24, 2011, #61/446,383. U.S. Patent Application Serial No.: 13/404,852. (internal ref# OSU1159US). Pending.

g. Active research grants

Submitted 11/13/2013. "Bioinspired glycomaterials from lipid and polymer trehalose conjugates." NSF-DMR (BMAT), 3-year research grant, $450,000. 8/15/2014-8/14/2017.
Submitted 7/5/2014. "Development of fluorogenic aptamers for detection and deactivation of Erbb receptors using bifacial PNA." NIH, 5-year single PI research grant. $1,396,785. 6/1/2015-5/31/2020.

h. Pending grant applications

none

i. Ph.D. Students (Graduated)

Yun Gong (2010), Mingming Ma (2010), Oscar Torres (2011), Zhun Zhou (2015), Xin Xia (2015)

j. Current Research Group

Zhun Zhou (2009), Xin Xia (2009), Xijun Piao (2010), Jie Mao (2011), Chris DeSantis (2011), Da'Sean Green (2012), Xiaoyu Zhang (2014), Yufeng Liang (2015), Oliver Munyaradzi (2015).

k. Selected Invited Lectures at Professional Meetings and Colloquia

•Origins of Life Initiative Forum, Harvard University, Cambridge, MA. December 16, 2015
•University of Göttingen, Germany. Chemistry Departmental Seminar. October 5, 2015
•BioNEC Symposium on Biomolecular Synthesis and Nanotechnology, Copenhagen, Denmark. October 2, 2015
•Gordon Research Conference: RNA Nanotechnology. Ventura, CA. February 1, 2015.
•University of North Carolina, Wilmington. Chemistry Departmental Seminar, March 28, 2014.
•ACS Dallas, "Structure and Function of Biomembranes" Symposium. March 17, 2014.

•Universidade Estaduale Paulista, Araraquarara, Instituto de Bioquimica. Biochemistry Department seminar. “Synthetic approaches to membrane fusion.” Araraquarara, São Paolo, Brazil. March 10, 2014.
•Universidade Estaduale Paulista, Araraquarara, Instituto de Bioquimica. Chemistry Department seminar. “Bifacial Peptide Nucleic Acid.” Araraquarara, São Paolo, Brazil. March 12, 2014
•Universidade São Paolo. Chemistry Department seminar. “Functional Molecular Recognition in Membrane Fusion and Nucleic Acid Function.” São Paolo, Brazil. March 13, 2014.
•Indo-US Science and Technology Forum, Bangalore, India. December 29-31, 2012.
•ACS Colloids, Baltimore. “Polymer Assembly and Function.” June 10, 2012.
•PEN-Nanocore Lecture Series, Koch Institute of Science, MIT. May 5, 2012.
•ACS San Diego, “Building Blocks for Chemical Biology.” March 28, 2012.