

## Philip S. Lukeman

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### Appointments

*Associate Professor of Chemistry* 2011-current  
*Tenured Associate Professor of Chemistry* 2014-current  
St. John's University, Chemistry Department

Research: Undergraduate and Master's students develop control modalities for biomolecules using 'DNA switches' and 'DNA Origami', enabling the production of sensing devices by using techniques at the interface of biotechnology and organic chemistry.

Teaching: Organic Chemistry (Primary lecturer: Organic I, Organic II for Pharmacy)  
Organic Chemistry Lab (Primary instructor: Honors/Majors Organic I, II, developed two new courses 'from scratch')  
Advanced Organic Chemistry (Primary Lecturer: Master's level, Supramolecular chemistry)

*Assistant Professor of Chemistry* 2007-2011  
California State Polytechnic University Pomona, Chemistry Department

Teaching: Organic Chemistry (Primary lecturer: Organic I,II, III, Introduction to Organic)  
Biochemistry (Guest lecturer: Biochemistry I,II)  
Organic Chemistry Lab (Primary instructor: Organic I, II,III, Introduction to Organic)  
Advanced Organic Chemistry (Primary lecturer: Master's level, Supramolecular chemistry)

*Clinical Assistant Professor of Chemistry (non tenure-track)* 2004-2007  
New York University, Chemistry Department

Teaching: Organic Chemistry (Primary lecturer: Organic I, II & Honors course)  
Organic Chemistry (Primary lecturer: Principles – course for non-majors)  
General chemistry (Primary lecturer: General Chemistry I - Honors course)  
Biochemistry (Guest lecturer: Biochemistry I, II)  
Organic Chemistry Lab (Primary instructor: Organic I, II Non-majors.)  
Supramolecular chemistry (Primary lecturer: Developed new course 'from scratch')

### Professional Preparation

New York University Chemistry: DNA Nanotechnology Postdoctoral Associate 1999 – 2004  
Advisor: Prof NC Seeman. *Research focus:* Biophysical and organic chemistry to control materials synthesis at the nanometer scale using Nucleic Acid Nanotechnology. Led Undergraduate and HS student research group, mentored graduate students and postdoctoral researchers.

Cambridge University, UK Chemistry: Molecular Recognition Ph.D. 1999  
Advisor: Prof JKM Sanders. Thesis: 'Controlling Dynamic Combinatorial Libraries'.  
*Research Focus:* Combinatorial synthesis under thermodynamic control to probe molecular interactions.

Leicester University, UK Chemistry B.Sc. (Hons) 1st class 1994

### Recent Funded Awards

Apr 08: Cal Poly Pomona Provost's Teacher/Scholar Award 2008-2010: \$11k over 2 years

Feb 09: CSUPERB Faculty-Seed startup grant: \$15k over 1 year

Apr 09: Research Corporation Cottrell College Science Award: \$42k over 2 years

Aug 10: NSF MRI – NMR Acquisition (Co-PI): \$400k

Aug 11: Army Research Office - Sole PI - Standard Research Grant: \$360k (\$245k direct) over 3 years

## **Publications** (\* Undergraduate Student co-author, † High School Student co-author)

- 13) Hanna M\*, Munshi M\*, Kedzierski N\*, Chung PN\*, Huang T\*, Mok AK, Lukeman PS, 'Photocleavage control of nucleated DNA nanosystems – the influence of surface strand sterics', *Nanoscale*, 2014, 6, 2094-2096
- 12) Lukeman PS, 'How to Mentor Undergraduates in the Lab', *Nature Nanotechnology*, 2013, 8, 784-786
- 11) Lukeman, PS, 'Hetero-oligonucleotide nanoscale tiles capable of two-dimensional lattice formation as testbeds for a rapid, affordable purification methodology', *Nanoscale*, 2013, 5 (12), 5266 - 5268
- 10) Lukeman PS, 'Nucleic Acid Nanotechnology: Modified Backbones and Topological Polymer Templates', in V.A. Erdmann and J. Barciszewski (eds.), *DNA and RNA Nanobiotechnologies in Medicine: Diagnosis and Treatment of Diseases, RNA Technologies*, Springer-Verlag Berlin Heidelberg, 2013
- 9) Mok AK\*, Kedzierski N\*, Chung P\*, Lukeman PS, 'Positional photocleavage control of DNA-based nanoswitches', *Chemical Communications*, 2011, 47 (17), 4905 - 4907
- 8) Zheng J, Lukeman PS, Sherman W, Micheel C, Alivasatos AP, Constantinou PE, Seeman NC, 'Metallic Nanoparticles Used to Estimate the Structural Integrity of DNA Motifs', *Biophysical Journal*, 2008, 95, 3340-3348
- 7) Liu Y, Wang RS, Ding L, Sha RJ, Lukeman, PS, Canary JW, Seeman NC, 'Thermodynamic analysis of nylon nucleic acids', *ChemBioChem*, 2008, 9 (10), 1641-1648
- 6) Lukeman PS, Stevenson ML\*, Seeman NC, 'Morphology Change of Calcium Carbonate in the Presence of two-dimensional DNA Lattices', *Crystal Growth & Design*, 2008, 8 (4), 1200-1202
- 5) Lukeman PS, Seeman NC, 'Nucleic Acid Nanostructures', *Reports on Progress in Physics*, 2005, 68, 237-270
- 4) Lukeman PS, Mittal AC†, Seeman NC, 'Two-dimensional PNA/DNA arrays', *Chemical Communications*, 2004, 15, 1694-1695
- 3) Zhu L, Lukeman PS, Canary JW, Seeman NC, 'Nylon/DNA: Single-stranded DNA with a covalently stitched nylon lining', *Journal of the American Chemical Society*, 2003, 125, 10178-10179
- 2) Lukeman PS, Sanders JKM, 'Macrolactone-based dynamic combinatorial libraries of cholate monomers bearing recognition functionality', *Tetrahedron Letters*, 2000, 41, 10171-10174
- 1) Rowan SJ, Lukeman PS, Reynolds D\*, Sanders JKM, 'Engineering diversity into dynamic combinatorial libraries by use of a flexible building block', *New Journal of Chemistry*, 1998, 22, 1015-1018

## **Selected Recent Technical Presentations** (all include presentations of work by undergrad students)

- 7/14 Council on Undergraduate Research. Poster.
- 7/14 Johns Hopkins University, Chemical and Biomolecular Engineering. Invited Seminar.
- 3/14 Southampton University, UK. Chemistry Department. Invited Seminar.
- 5/13 Rutgers University, NJ. Biochemistry department. Invited seminar.
- 5/13 Gordon Conference on Supramolecular Chemistry, Les Diablerets, Switzerland.  
Poster: 'Undergraduate Conducted DNA-Based Nanotechnology: Photochemical Switch Control - Virus Binding Claws - Designer Triangles'.
- 5/13 Cardiff University, UK. School of Chemistry. Invited seminar.
- 4/13 Seattle University, WA. Chemistry department. Invited seminar.
- 4/13 Foundations of Nanoscience Conference, Snowbird, UT. Poster: 'Undergraduate Conducted DNA-Based Nanotechnology: Photochemical Switch Control - Virus Binding Claws - Designer Triangles'.
- 2/13 New York University, NY. Chemistry department, New York Nanoscience Group. Invited seminar.
- 1/13 City College New York, NY. BioDesign working group meeting. Invited seminar.
- 10/12 University of Puerto Rico, PR. Chemistry department. Invited departmental seminar.
- 9/12 University of Manchester, UK. Biosciences and Chemistry department. Invited center-wide seminar.
- 2/12 Brookhaven National Laboratories, NY. Center for Functional Nanotechnology. Invited seminar.
- 11/11 Boise State University, ID. Engineering. Invited college-wide seminar.
- 4/11 Foundations of Nanoscience Conference, Snowbird, UT.  
Contributed talk. 'Photocleavage Controlled DNA Switches and Nanochemistry for Noobs'.
- 4/11 CSU Long Beach, CA. Chemistry department. Invited departmental seminar.

## **Selected Recent Invited Presentations on Public Communication of Science**

9/13 'Empiricist League', Brooklyn, NY. Public nanotech seminar at bar: 'We Weave Wee Widgets'

12/10 'Mindshare', Los Angeles, CA. Public nanotech seminar at movie theater: 'Get Your Nano-Wood On'.

5/10 University of Buffalo, NY. Presentation and workshop participant in design of nano-exhibition & curriculum. 'Nano-sensing: vision, touch, sound',

1/10 UCLA Center for Society and Genetics, Los Angeles, CA, Panelist and workshop leader as part of 'Outlaw Biology? Public Participation in the Age of Big Bio'

3/09 Machine Project Art Gallery, Los Angeles, CA. Public engagement in nanotechnology: Seminar/art event entitled 'Get Your Nano-Wood On!' w/Paul Rothemund/Caltech.

## **Service**

Development of new 2-Semester Honors/Majors Organic Chemistry Lab and TA training program (2012-current). Group co-ordinator for Chemistry Department Organic Division (2010-11). Co-ordinator for RISE (NIH) program, improving the pipeline of under-represented minority students into Biomedical PhDs (2010-11).

Proposal Peer Review panel : Office of Naval Research (2013-current), Center for Functional Nanomaterials, Brookhaven National Laboratories (2009-current), CSUPERB (2010-2011). Ad-hoc proposal review: Volkswagen Foundation (2013-current), Army Research Office (2012-current), Cottrell College Science Foundation (2010-current), ACS PRF (2011-current), Project Reviewer and Session Moderator: Southern California Conference on Undergraduate Research (2009-2011).

Peer review of articles for: Royal Society of Chemistry (Chemical Communications, Nanoscale, New Journal of Chemistry), Wiley (Chemistry - A European Journal, Protein Science), American Chemical Society (JACS, Nano Letters, Langmuir, Journal of Combinatorial Chemistry, ACS Nano), Bentham (Letters In Organic Chemistry), Indian Academy of Sciences (Proceedings of the Indian Academy of Sciences). Organic Chemistry textbook review for McGraw Hill, Prentice Hall, Freeman, Wiley.

Committees: (2012-). Department: UEPC. College Level: Liberal Arts Faculty Council (2007-2011) University: Faculty Affairs. College Level: Mission Planning, College-wide initiatives. Chemistry department: Chaired: TA/Lecturer quality assessment, Student Research Awards. Member: Safety, Tenure/Promotion document revision, Analytical/Physical Search, Graduate Studies.

Organizer (with Prof. G. Chen) of St. John's Chemistry Symposium 'Frontiers of Nano and Bioanalytical Chemistry' (2013). Organizer (with Prof. A.Hyslop) Chemistry department Undergraduate Summer seminar series.

Organizer of Cal Poly Student Demos at ACS National Chemistry Week (2009) and of Cal Poly's contribution to High School Science Fair Expo for Riverside/San Bernadino County (2009).

## **Experimental Technique Roster**

Hands-on proficiency and method development skills with gel electrophoresis, spectroscopy (UV/Vis, fluorescence), enzymatic modification and synthesis of DNA, solid-phase synthesis, Atomic Force Microscopy, chromatography (small molecule and biomolecule HPLC), Dynamic Light Scattering, other standard organic synthetic and analytical biochemistry benchwork. Other hands-on skills include IR,  $^1\text{H}$  and  $^{13}\text{C}$  NMR, GC-MS, ESI-MS, HPLC-ESI-MS, MALDI-MS, SEM.

## **Collaborations and other Affiliations**

Research Collaborators: Prof Matthew Francis, Chemistry, UC Berkeley. Prof Kevin Plaxco, Chemistry, UC Santa Barbara. Prof David Peabody, Microbiology, U of New Mexico. Prof Colin Parrish, Virology, Veterinary College, Cornell U. Prof Paul Paukstellis, Chemistry, U of Maryland. Prof Matthew Sazinsky, Chemistry, Pomona College. Prof Kenzo Fujimoto, Materials Science, JAIST, Japan.

Teaching Collaborators: Prof N Anderson, Visual Studies, SUNY Buffalo. Prof MT Swihart, Chemistry, SUNY Buffalo.

## Professional Society Memberships

International Society For Nanoscale Science, Computation and Engineering (ISNSCE)  
Council On Undergraduate Research (CUR)  
American Chemical Society (ACS).

## References

1) Professor Patrick W Mobley E-mail: [pwmobley@csupomona.edu](mailto:pwmobley@csupomona.edu)  
Chemistry Department, California State Polytechnic University,  
3801 W Temple Ave, Pomona CA 91768  
Tel: 909 869 3691

2) Professor Nadrian Seeman E-mail: [ncs1@scivis.nyu.edu](mailto:ncs1@scivis.nyu.edu)  
3) Professor James Canary E-mail: [james.canary@nyu.edu](mailto:james.canary@nyu.edu)

Both at: New York University, Department Of Chemistry  
31 Washington Place, New York NY 10003  
Tel: 212 998 8400

4) Professor Jeremy KM Sanders E-mail: [jkms@cam.ac.uk](mailto:jkms@cam.ac.uk)  
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