Darlene K. Taylor

Current Research Interests:
Engineering oligomers and polymers at the molecular level to study their structure-property relationships; materials for solar cells; smart biomaterials for drug delivery; polymer optics.

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http://www.linkedin.com/pub/darlene-k-taylor/10/964/373

Personal

Born November 1, 1967 in Burlington, North Carolina, USA
Married with three children

Education

2009 – 2011	Clinical Research Training Program, Duke University Medical Center
1998 – 2000	Postdoctoral Fellowship, University of North Carolina at Chapel Hill; (Advisor: Professor Joseph M. DeSimone)
October 1998	Ph. D. Physical Polymer Chemistry, University of North Carolina at Chapel Hill; "Polar Ordering in Rigid to Semi-Flexible Nonlinear Optical Side Chain Polymers" (Advisor: Professor Edward T. Samulski)
May 1994	M.S. University of North Carolina at Chapel Hill; "The Mechanism of Coupling in Cyclophane Biradicals" (Advisor: Professor M. D. E. Forbes)
August 1992	M.S. Analytical Chemistry, North Carolina A&T State University, "A Modified NMR System for Static and On-line Measurements of Polymer Solutions" (Advisors: Dr. H. Lee McPeters and Professor A. Williamson)
May 1989	B.A. Chemistry, Goucher College;

Professional Positions

2011 – Present	Adjunct Member, Department of Chemistry, University of North Carolina at Chapel Hill
2011 – Present	Adjunct Member, Department of Obstetrics and Gynecology, Duke University Medical Center
2006 – 2008	Consultant, Fuxin Hengtong Fluorine Chemicals Co., China
2005 – Present	Assistant Professor of Chemistry at North Carolina Central University

Awards and Honors

- 2011 Technology Development Award, NCCU
- 2008 recipient of BIRCWH Scholar Award, Duke University Medical Center
- 2007 recipient of the Supercomputing (SC07) Education Program Award
- 2007 Excellence in Research Award, College of Science and Technology at NCCU
- 2007 recipient of Duke/NCCU STEM Partnership Award to collaborate at Duke University (w/ E. Toone)
- 2006 Faculty Fellow, Computations Science Education Reference Desk, Shodor Org., (2 weeks in Summer)
- 1995 Hoechst Celanese Fellow
- 1993 Department of Education Fellow
- 1990 Scholar in Residence at Rohm and Haas (Norristown, PA)

Affiliations

2005 – Present	Materials Research Society (MRS)
2006 – Present	National Organization of Black Chemists and Chemical Engineers (NOBCChE)
1992 – Present	American Chemical Society (ACS)

Service

Department of Chemistry:

2010	Member Faculty Search Committee
2009 – 2011	Delegate, Faculty Senate
2006 – Present	Co-Organizer (w/ Mukhopadhyay), Chemistry Department Seminar Series
2006 – 2007	Co-Chairperson (w/ Mukhopadhyay), Chemistry Department Publication/Communication
2008 - 2009	Co-developed brochure and website (w/ Sendlinger) for our Chemistry department
2008	Hosted recruitment events for ABSS High School Students
2010-2011	Scribed minutes for most of Chemistry Department Meetings

University:

2005– Present	Faculty Marshall, NC Central University
05/25/2011	Speaker, Inaugural NCCU Graduate Alumni Reception
01/27/2011	One of two faculty requested to host incoming President Thomas Ross during his tour of NCCU
09/22/2010	Speaker, September Meeting of NCCU Board of Trustee
03/30/2010	Speaker, NC Biotech Research Interest Meeting hosted by NCCU Office of Sponsored Research

Profession:

2011	Reviewer, National Science Foundation Panel
2011	Session Organizer, Biomimetics & Biomaterials, National Meeting of Institute Biological Engineering
2008	Session Organizer, Bioapplications in Physical Chemistry, National Conference of NOBCChE
2007	Reviewer, National Science Foundation Panel
2006	Moderator, Physical Chemistry Session, Local Conference of ACS
2004	Session Co-organizer (w/ J.M. DeSimone), Green Chemistry and Manufacturing, SERMACS
2005	Reviewer, National Science Foundation Panel
2010	Grant Reviewer for Petroleum Research Fund

Community:

2002 – 2008	Outreach Manager, NSF S&T Center for Environmentally Responsible Solvents and Processes
2000 – 2008	Editor, CERSP News, a publication of the STC Environmentally Responsible Solvents & Processes
1999 – 2001	Technical Coordinator, Kenan Center for Utilization of Carbon Dioxide in Manufacturing, NC State
07/17/2007	Coordinated (w/ M Bellamy, Science House) High School Teachers workshop at NCCU
01/23/2008	Science Demonstrations, Blessed Sacrament School, Burlington, NC
04/02/2011	Laboratory Science Demonstrations, Women Inspiring Learning Momentum
06/25/2011	Demonstrations, Delta Sigma Theta Chapter, Science in Everyday Experiences (SEE) Camp

Research Positions

2008 – Present, BIRCWH Scholar, Duke University
(Mentored by Donald McDonnell and Eric Toone)
Design and evaluate (both the efficacy and pharmacology) the hyperbranched polyglycerol platform for targeted drug delivery in diseases related to women's health.

2002 – 2004, Research Associate, University of North Carolina at Chapel Hill.
(Advised by Professor Joseph M. DeSimone)
Utilized attenuated total reflection-Fourier transform infrared spectroscopy to monitor *in situ* solution and bulk free radical copolymerizations of methyl methacrylate and fluorinated methacrylates. Compared this technique to ^{1}H NMR measurements. Determined the reactivity ratios for these copolymerizations in supercritical CO_2, bulk, and freon.

1994 – **1998, Research Assistant**, University of North Carolina at Chapel Hill.
Designed novel monomers and developed HPLC purification protocol. Characterized monomer purity by various spectroscopic techniques including NMR, FTIR, UV-Vis. Polymerized monomers by step growth polymerizations and characterized by spectroscopic techniques as well as thermal analysis techniques such as TGA and DSC. Utilized second harmonic generation to investigate the electric field induced polar order stability of nonlinear optical chromophores covalently attached as side chains to rigid backbone polymers.

1991 – **1994, Research Assistant**, University of North Carolina at Chapel Hill.
Conducted synthesis and spectroscopic characterization of cyclophanes. Studied biradicals in solution as function of temperature and radical structure by time-resolved Electron Paramagnetic Resonance. Modeling studies were utilized to elucidate the mechanism of interaction between the closely associated biradical end groups.

1990 – 1991, Research Technician, Rohm and Haas Company Norristown, Pennsylvania.
Utilized low resolution NMR as an online process and quality control technique for polymerization reactions.

Summer 1988, Nova Pharmaceutical Corporation, Baltimore, Maryland,
Isolated and radiolabeled rat brain tissue and screened drugs for receptor activity.

Advising

Present Research Group Members

Student Name	Position
Ochieng, Melony	Undergraduate (01/2009 – Present)
Burrell, Alethia	Undergraduate (01/2011 – Present)
Chand, Lokendra	Masters (expected graduation 05/2012)
Le, Khoa	Masters (expected graduation 05/2013)
Griffin, Colette	Masters (extended leave of absence)

Past Research Group Members

Student Name	Position	Current Location
Gibson, Melody	Masters (05/2008)	University of Connecticut
Mubalutila, M.	Undergraduate (2006 – 2009)	unknown
Koepnick, Brian	High School (01/2006 – 05/2008)	Wake Forest University
Jackson, Alexander	Undergraduate (Summer 2009)	Kraft Company
Karioki, Lee	Undergraduate	unknown
Ukponmwan, Sylvia E.	Undergraduate (2006-2008)	unknown
Lipscomb, Jeremy	Undergraduate (2008-2010)	Campbell University
Le, Khoa	Undergraduate (Spring 2011)	NCCU Master's Program
Battle, Jerray	Masters (expected 12/2011)	NCCU Master's Program (w/ Dr. Gerald)

Current Postdoctoral Fellows

Dr. Fang Zhen 03/2010 – Present (at UNC-Chapel Hill)

Titles of M.S. theses completed in the Taylor lab

Ms. Melody Gibson— The hyperbranched polyglycerol platform: Synthesis towards a transporter for anticancer drugs.

Teaching

CHEM 4010/Physical Chemistry I (4.0) and CHEM 4020/ Physical Chemistry II (4.0)

6 students a year

15 3-hour lectures, 1-hour recitation, and 3-hour laboratory per week

An introduction to fundamental principles of physical chemistry. The first course in this topic covers gases, chemical thermodynamics, thermochemistry, physical and chemical equilibria, solutions, and chemical kinetics. The second course covers the theory of quantum mechanics and its application to chemistry including a survey of various spectroscopic techniques. A laboratory manual was developed for CHEM 4020 and will be updated for Spring 2007 based on feedback from the students and experience with the activities. Many of the experiments were theoretical or computer based adaptation of traditional labs. This was necessary since much of the equipment and chemicals were not available due to our recent relocation to Mary Townes Science Complex.

CHEM 4900/ Applied Math (2.0)

6 students a year

15 2-hour lectures per week

The application of calculus and advanced mathematical techniques to physical chemistry. This course provides many of the skills students need to master the second semester of physical chemistry (CHEM 4020). Calculus and advanced mathematical techniques are emphasized to build confidence and familiarity in working with operators, eigenfunctions, matrices, etc.

CHEM 5730/ Chemical Thermodynamics (3.0)
3 students a year
15 3 - hour lectures per week

This is a graduate level course taught in two parts: 1) Classical Thermodynamics and 2) Statistical Thermodynamics. All of the students taking this course were deeply interested in pharmaceutical/biological research questions. I attempted to augment their appreciation for thermodynamics by assigning projects that required each student to write and orally present a proposal that was rooted in thermo principles applied to the drug industry. The reports and presentations were externally reviewed by graduate students in the chemistry department. An example report and review comments are provided in the appendix.

CHEM 1200L/General Chemistry II Lab (0.0)
48 students a year
15 3-hour laboratory per week

An integrated course of general chemistry and qualitative analysis. A laboratory manual has been co-developed by Taylor and the lead instructor (Dr. Jim Ellenson).

Current Collaborators

Duke: Friederike Jayes, Phyllis Leppert, Donald McDonnell, Gabriel Lopez, Ashutosh Chilkoti; UNC-CH: Valerie Sheares-Ashby, Michael Rubinstein, Thomas Meyer; NC State: Stefan Franzen; Villanova: Dorothy Skaf; NCCU: K. Vinodgopal, B. Vlahovic, LiJu Yang, John Bang, Kevin Williams, David Kroll, Al Williams, Marvin Wu.

Refereed Publications and Recently Submitted Manuscripts

(Independent Publications at North Carolina Central University; $^{\mp}$ = undergraduate; † =high school co-authors)

1. **Taylor, D.K.**; Burrell, A.$^{\mp}$ Release of Hydrophilic and Hydrophobic Drugs from Hyperbranched Polyglycerol Based Nanocarrier. *Molecular Pharmaceutics*, **2011**, in preparation.

2. **Taylor, D. K**.; Skaf, D. W. Everyday Uses of CO_2. *J. Chem. Ed*., **2011**, submitted.

3. **Taylor, D. K.**; Jayes, F. L.; House, A.; Ochieng, M. A.$^{\mp}$ Temperature-Responsive Biocompatible Copolymers Incorporating Hyperbranched Polyglycerols for Adjustable Functionality. J. Functional Biomaterials, **2011**, *2*, 173-194.
4. Koepnick, B. D.†; Lipscomb J.S.$^{\mp}$; **Taylor D. K**. Effect of Substitution on the Optical Properties and HOMO-LUMO Gap of Oligomeric Paraphenylenes. *J. Physical Chemistry A* **2010**, *114(50)*, 13228-13233.

5. **Taylor, D.K**.; McDonnell, D.; Toone E.; Leppert, P. A.; Jayes, F. L. Fibroid Therapy Enabled by the Hyperbranched Polyglycerol Platform *J. Women's Health* **2009**, 18(10), 1512-1512.

Previous Refereed Publications

(Taylor has 7 publications (53 citations) as measured by Science Citation Index in August 2011)

5. André, P.; Lacroix-Desmazes, P.; **Taylor, D. K**.; Boutevin, B. "Solubility of Fluorinated Homopolymer and Block Copolymer in Compressed CO_2", *J. Supercritical Fluids*, **2006,** *37***,** 263-270. **(# of citations = 8)**

6. **Taylor, D. K.**; Keiper, J.; DeSimone, J. M. "Polymer Self-Assembly in Carbon Dioxide", *Ind. Eng. Chem. Res*. **2002**, *41*, 4451-4459. **(# of citations = 9)**

7. Wells, S.L.; **Taylor, D.** ; Adam, M.; DeSimone, J. M.; Farago, B. "Study of the Association of a Diblock Copolymer and Absorption of an Insoluble Homopolymer in CO_2", *Macromolecules* **2001***, 34(18),* 6161-6163. **(# of citations = 4)**

8. **Taylor, D. K.**; Carbonell, R.; DeSimone, J. M. "Opportunities for Pollution Prevention and Energy Efficiency Enabled by the Carbon Dioxide Technology Platform", *Annu. Rev. Energy Environ.* **2000**, *25*, 115-146. **(# of citations = 21)**

9. **Taylor, D. K.**; Samulski, E. T. "Synthesis and Characterization of Poly(p-phenylene)s with Nonlinear Optical Side Chains", *Macromolecules* **2000**, *33*, 2355-2358. **(# of citations = 11)**

Patents

US Provisional Patent 61/380,076 September 3, 2010; "Biodegradable Liquogel and Method for Local Treatment of Uterine Fibroids"; Invento**rs -**Taylor, DK and Ochieng, MO.

Presentations

(* = Peer Reviewed; $^{\mp}$ = undergraduate; † =high school co-authors)

1. Fibroid Therapy Enabled by the Hyperbranched Polyglycerol Platform: Development of an Injectible Thermoresponsive Drug Carrier System, Darlene K Taylor and Friederike Jayes, Grand Rounds Ob/Gyn Department, Wednesday, March 16, **2011**, Duke University (invited).

2. Biodegradable Hyperbranched Polyglycerol Based Hydrogel with Tunable Properties and Encapsulated Drug for Localized Therapy. D. K. Taylor, IBE Annual Conference March 3-5th, **2011** Atlanta, GA.

3. The Hyperbranched Polyglycerol Based Nanocarrier: Treatment for Fibroids. DK Taylor, Proceedings of the BIRCWH Scholar Symposium, February 25, **2011**, Duke University.

* 4. A Bifunctional pH-sensitive Polymetric Drug Delivery System for Breast Cancer. M. A. Ochieng$^{\mp}$; D. K. Taylor, abstract In: Proceedings of the 102nd Annual Meeting of the American Association for Cancer Research;, Apr 2-6, **2011,** Orlando, Florida.

* 5. A nanocarrier drug delivery system for fibroid treatment. Darlene K Taylor, Melony A Ochieng, Friederike L Jayes, Phyllis C Leppert, Proceedings of the Triangle Research of Biology and RTI, March 19, **2011**, RTI, NC.

* 6. Nanocarrier as a drug delivery system for fibroid treatment. D K Taylor, M A Ochieng[Ŧ], F L Jayes, and P C Leppert, Proceedings of the NIH National Fibroid Congress, November 22-23, **2010**, Washington, D.C.

7. An Update on the HPG Nanocarrier, D K Taylor, BIRCWH SCORE Conference, November 8, **2010**, Washington, D.C.

8. The effect of temperature on a crosslinked hyperbranched polyglycerol-drug conjugate. M Ochieng[Ŧ] and D.K. Taylor Proceedings of Abstracts at 36th National Conference of National Organization of Black Chemists and Chemical Engineers, April 15, **2009**, St. Louis, MO.

9. The hyperbranched polyglycerol platform: approaching the ideal-drug delivery system. Proceedings of Abstracts for Duke Research Day, Taylor, D., May 6, **2009**, Duke University.

10. Tailored drug therapies enabled by the hyperbranched polyglycerol platform. D. K. Taylor, Glaxo Smith Kline, May 16, **2008**, RTP, NC.

* 11. Towards water-soluble star copolymer-drug conjugates (invited). B. Ibraheem, M. Mubalutila[Ŧ], A. Jackson[Ŧ], D. K. Taylor, Proceedings of 58th Conference of South East Regional American Chemical Society, November 1-4, **2006**, August, GA,

12. Environmentally Friendly Alternatives for the Dry Cleaning and Printing Industries (Invited). Taylor, D. K.; DeSimone, J. M.; Carbonell, R. G. NSF Workshop on Environmentally Benign Process Research Needs, August 14-16, **2002**, Hancock, MA,

13. Center for Environmentally Responsible Solvents and Processes. exhibit/recruitment booth at National Organization Black Chemists Chemical Engineers, April **2001**, Baltimore, MD

* 14. Self-Assembly of Mixed Micelles in CO_2 as Investigated by SANS. Taylor, D. K.; Wells, S.; Yoshia, E.; Rubenstein, M.; Adam, M.; DeSimone, J. M. Proceedings of the PolyMillennial **2000** Conference, December 2000 Waikoloa, Hawaii.

* 15. Investigating the Alignment of Rigid Rod Polymers. Taylor, D. K.; Samulski, E. T. Proceedings of the Gordon Conference on Polymers, Ventura, California, January **1997**.

* 16. Poly(p-phenylene)s with NLO Sidechains. Taylor, D. K.; Samulski, E. T. Proceedings of the International Chemical Congress of Pacific Basin Societies, December **1995**, Honolulu, Hawaii,

17. North Carolina A&T State University Chemistry Awards Banquet May **1991(**Invited Speaker)

18. North Carolina A&T State University Chemistry Awards Banquet May **2002** (Invited Speaker).

19. Taylor, D. K.; DeSimone, J. M. “Triple Bottom Line”: Building the Carbon Dioxide Technology Platform Clean Solvent Symposium, Proceedings of Abstracts of Papers of the Amer. Chem. Soc. 220: 71-IEC Part 1 AUG 20 **2000**.

20. Taylor, D. K.; McPeters, H. L. “Polymer Solution Analysis by a Small NMR Spectrometer.” in Proceedings in the 18th Annual Meeting of the National Organization for the Professional Advancement of Black Chemists and Chemical Engineers, April 1-5, **1991**.

Funded Proposals (Total Grants Raised: $1,459,768)

ACTIVE RESEARCH SUPPORT

1. NSF Centers of Excellence for Materials Research and Innovation (CEMRI) [G. Lopez, Duke] 09/2011 – 08/2013
   NSF Solicitation 10-563
   “Stimuli-responsive polymeric systems are continually emerging with application in technologies such as drug delivery systems.” The goal of this seed proposal is the synthesis and characterization of a triple responsive block copolymer.
   Role: Subaward PI ($255,359)

2. NSF Centers of Research Excellence in Science and Technology (CREST) [B. Vlahovic] 09/2011 – 07/2012
   NSF Solicitation 09-510 Supplemental
   This proposal seeks funds to produce reduced graphene oxide-polymer hybrids where the polymer is grafted on the graphene surface, through a surface initiated polymerization process.
   Role: Co-Investigator ($99,999)

3. 5 K12 HD043446-04 [E. Odonee, Duke] 6/01/2008 – 05/31/2012
   NIH/ORWH /BIRCWH
   Potential Breast Cancer Chemotherapy Agents Enabled by the Hyperbranched Polyglycerol Platform
   The goal of this study is to investigate the efficacy of the hyperbranched polyglycerol platform as a nanocarrier of anti-fibroid drugs for local treatment of uterine fibroids and targeted delivery to breast cancer tumors.
   Role: Scholar ($400,000)

4. DMR-0959679 (Wu) 02/01/2010 – 01/31/2012
   NSF
   “MRI-R2: Acquisition of an Environmental Field Emission Scanning Electron Microscope for Research and Education at NCCU.”
   Funding for a high resolution environmental field emission scanning electron microscope (FESEM) to support nanoscence research and education across science departments and research institutes at NCCU.
   Role: Co-PI ($542,860)

5. DE-SC0001011 (Meyers) 07/01/2009 – 06/30/2014
   DOE / ARRA
   “UNC-CH EFRC: Solar Fuels and Next Generation Photovoltaics”
   This project complements the stated goals of the EFRC to design novel polystyrene scaffolds and bipyridyl ruthenium nanoscale architectures for assembly into cheap efficient solar devices. Postdoc (1/2) is advised at UNC on the project.
   Role: Subaward PI ($50,000)

COMPLETED RESEARCH SUPPORT

6. 5-G11-HD041831-05 (Nwosu) 2006-2007
   NIH/ NICHD EARDA Pilot
   "Hyperbranched Polyglycerols as a Therapeutic Platform"
   Design, develop and characterize hyperbranched polymers as a drug delivery system
   Role: Investigator ($15,000)

7. Duke/NCCU Stem Partnership (Taylor) 2007-2008
   "Hyperbranched Polyglycerols as a Theraeutic Platform for Toxmoxifen Metabolites"
   This project continues development of the hyperbranched polymer drug delivery system
   Role: Principal Investigator ($5,000)

8. 45702-GB10 (Taylor) 2006-2008
   ACS Petroleum Research Fund Type G
   "Investigations of the Synthetic, Structural, and Energetic Properties of Hypbrid Inorganic Oligo(p-Phenylene)s Core Shell Particles"
   The goal of this project is to design and systematically prepare oligomerics of different lengths and side chain groups. The effects of these parameters on the optical and electronic properties of the materials will be explored.
   Role: Principal Investigator ($35,000)

9. 45702-GB10 Supplemental 5/1/2007 - 8/31/2007
   "Design and Synthesis of Core-Shell OptoElectronic Nanoparticles,"
   Agency: ACS PRF;
   Summer Research Fellowship
   Role: Co-PI [w/ K. Roberts, NC A&T] ($8,000)

10. Contract (Taylor) 10/2006 - 06/2007
    Agency: Fuxin Heng Tong Fluorine Chemicals Co. Ltd
    "Chemical Process Development and Property Characterization of New Industry,"
    Role: Co-PI ($48,550)

PENDING

11. NSF Historically Black Colleges and Universities Research Initiation Award (HBCU-UP)
    NSF Solicitation 11-519
    This Research Initiation Award proposal is focused on fundamental physical studies to elucidate correlations between structure, function, dynamics, and binding in nuclei acids and enzymes in efforts to understand biomolecular function. Three systems will be investigated: model oligioneucleotides, hairpin crosslinks in RNA, and enzyme dehaloperoxidase. We will utilize five experimental physical methods –high pressure liquid chromatography, UV-Vis spectrometry, fluorescence spectrometry, photocrosslinking, and calorimetry – in conjunction with computational studies – to systematically study interactions in these biopolymers. Modeling studies will facilite the conformational flexibility of both single-stranded and double-stranded oligonucleotides.
    Role: PI ($200,000)