

Alvin W. Orbaek
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Education

Rice University, Houston TX
Ph.D. Chemistry (GPA: 4.06, 226 hours) 2012
Master of Arts, Chemistry May 2010
International Space University, Strasbourg, France
Certificate in Space Studies (66% grade average) August 2006
Universidad Polytechnic Catalonia, Barcelona, Spain
Space Studies (87% grade average) May 2003
National University of Ireland Galway, Galway, Ireland
B.Sc. Experimental Physics, Honors degree 2.1 (62% grade average) May 2003
Scariff Community College, Scariff, Co. Clare, Ireland
Leaving Certificate (67% grade average) May 1999

Qualifications

I am a Ph.D. student in Chemistry who has undergone extensive training in many fields, ranging from business and finance to people management; while also developing a host of specialized technical skills. I have a multi-disciplinary background gained through many diverse jobs. I am interested in solving problems, then finding and implementing solutions. I am willing to acquire skills if I do not already possess them, I am willing to learn, and teach those that need my help. I am a good team player, and I have experience in managing both people and resources. I am adept at focusing myself, and working independently when required. I am an enthusiastic person and aim to bring positivity to those around me, yet I carry out my roles with integrity. I am a dependable person who can be relied on.

Work Experience

Rice University, Houston TX

Research Assistant

2006-Present

Conducted original research focusing on the synthesis and chemistry of single walled carbon nanotubes, under the guidance of Professor Andrew R. Barron. Contributed to peer-reviewed journals, research proposals, and several patents. Development of teaching curriculum for undergraduate students at Rice, and high school students in locality using silver nanoparticles.

Teaching Assistant

2007-2009

Provided pre-lab instruction, guided students in the laboratory, and graded lab reports for the Freshman Chemistry course.

Research Intern

October 2006-April 2007

Awarded one of 12 positions in a countrywide government sponsored internship placing Irish students in top American nanotechnology institutes. Successfully completed SWNT synthesis, contributed to work that was later presented at ACS meeting.

CTAE, Barcelona, Spain

Junior Engineer

May 2007-August 2007

Galactic Suite Space Hotel.

Deloitte S₂G, Barcelona, Spain

Accounts Payable Assistant

2003 – 2005

Record Retention manager, Training coordinator. Six-sigma training.

Tin Pan Alley, San Antonio, Ibiza, Spain

DJ

1997

The Atlantic Hotel, Ballybunion, Co. Kerry, Ireland

DJ

1995 – 1996

Raidió Teilifís Éireann, Donnybrook, Co. Dublin, Ireland

Echo Island Correspondent

1994

National television correspondent for children's show Echo Island. Reported on local affairs and stories that were of interest.

Patents

- MAGNETIC PARTICLES FOR DETERMINING RESERVOIR PARAMETERS
- ANALYZING THE TRANSPORT OF PLASMONIC PARTICLES THROUGH MINERAL FORMATIONS

Awards

- American Chemical Society, recognition of Project SEED work. 2011 and 2010
- Harry B. Weiser award for excellence in teaching. 2009

Skills & Training

- *Characterization Techniques:*
SEM, EDAX, AFM, STM, TEM, HRTEM, STEM, TGA, TGA, XPS, Raman Spectroscopy, UV-vis Spectroscopy and FTIR Spectroscopy.
- Synthesis techniques include inert gas techniques, schlenk lines and dry-box techniques.
- Participated in the patent writing and communication of scientific concepts for the patenting of materials used for “down-hole” applications pertinent to the oil and gas industry. 2010
- PADI certified diver. 2011
- Entrepreneurship and Business Planning (12 weeks) - Rice Alliance, Rice University, Houston, TX, USA. 2009
- Technology Entrepreneurship Workshop (16 hours) - Rice Alliance, Rice University, Houston, TX, USA. 2009
- HAZWOPER First Responder Awareness Training - Hazmat Harris County Fire Department, Houston TX, USA. 2006
- Fundamentals of Medical Physics (20 hrs) – International Univ. Andalucía, Spain. 2006
- Advanced Excel training / Programming (16 hrs) – Deloitte S₂G, Barcelona, Spain. 2005
- Advanced Accounting (48 hrs) – Deloitte S₂G, Barcelona, Spain. 2005
- Accounting (40 hrs) – Deloitte S₂G, Barcelona, Spain. 2004

Languages

English = Native speaker. Spanish, Danish, and Catalan = Conversational and moderate professional.

Peer-reviewed Publications

1. Overcoming “Coffee-Stain” Effect by Compositional Marangoni Flow Assisted Drop-Drying. Mainak Majumder, Clint S. Rendall, J Alexander Eukel, James Y.L. Wang, Natnael Behabtu, Cary Pint, Tzu-Yu Liu, **Alvin W. Orbaek**, Francesca Mirri, Jaewook Nam, Andrew R. Barron, Robert H. Hauge, Howard K. Schmidt, Matteo Pasquali. *J. Phys. Chem. B*, (2012) 116 (22), pp 6536–6542
2. Effect of carbon nanotube-fullerene hybrid additive on P3HT:PCBM bulk-heterojunction organic photovoltaics. Alley, Nigel J.; Liao, Kang-Shyang; Andreoli, Enrico; Dias, Sampath; Dillon,

- Eoghan P.; **Orbaek, Alvin W.**; Barron, Andrew R.; Byrne, Hugh J.; Curran, Seamus A. *Synthetic Metals* (2012), 162(1-2), 95-101.
3. Increasing the Efficiency of Single Walled Carbon Nanotube Amplification by Fe–Co Catalysts Through the Optimization of CH₄/H₂ Partial Pressures. **Orbaek, Alvin W.**; Owens, Andrew C.; Barron, Andrew R. *Nano Letters* 11(7), 2871-2874 (2011)
 4. Dextran Coated Ultrafine Superparamagnetic Iron Oxide Nanoparticles: Compatibility with Common Fluorometric and Colorimetric Dyes. Griffiths, Sioned M.; Singh, Neenu; Jenkins, Gareth J. S.; Williams, Paul M.; **Orbaek, Alvin W.**; Barron, Andrew R.; Wright, Chris J.; Doak, Shareen H. *Anal. Chem.*, 83(10), 3778-3785 (2011)
 5. Wet Catalyst-Support Films for Production of Vertically Aligned Carbon Nanotubes. Alvarez, Noe T.; Hamilton, Christopher E.; Pint, Cary L.; **Orbaek, Alvin**; Yao, Jun; Frosinini, Aldo L.; Barron, Andrew R.; Tour, James M.; Hauge, Robert H. *ACS Appl. Mater. Interfaces* 2(7), 1851-1856 (2010) DOI:10.1021/am100128m
 6. Dendrimer-Assisted Self-Assembled Monolayer of Iron Nanoparticles for Vertical Array Carbon Nanotube Growth. Alvarez, Noe T.; **Orbaek, Alvin**; Barron, Andrew R.; Tour, James M.; Hauge, Robert H. *ACS Appl. Mater. Interfaces* 2(1), 15-18 (2010)

Oral Presentations

1. **Orbaek, Alvin W.**; Rivera, Erika; Hamerly, Ryan T.; Frewer, Andrew; McHale, Mary M.; Barron, Andrew R. Teaching the scientific process with silver nanotechnology. Abstracts, Joint 66th Southwest and 62nd Southeast *Regional Meeting of the American Chemical Society*, New Orleans, LA, United States, December 1-4 (2010)
2. **Orbaek, Alvin W.**; Owens, Andrew C.; Barron, Andrew R. Amplification of single walled carbon nanotubes as a route to achieving the armchair quantum wire. Abstracts, Joint 66th Southwest and 62nd Southeast *Regional Meeting of the American Chemical Society*, New Orleans, LA, United States, December 1-4 (2010)
3. **Orbaek, Alvin**; Phillips, Mallam Nkrumah. Using silver nanotechnology to teach chemistry in a high school curriculum. *STAT CAST Houston* (2010)
4. **Orbaek, Alvin W.**; Barron, Andrew R. Catalytic growth of single walled carbon nanotubes from catalyst nanoparticles. Abstracts of Papers, 239th *ACS National Meeting*, San Francisco, CA, United States, March 21-25 (2010)
5. **Orbaek, Alvin**; Phillips, Mallam Nkrumah; Nichol, Carolyn Aitken; McHale, Mary E. R.; Barron, Andrew R. Silver nanoparticle synthesis in a robust one-pot room temperature reaction. *ACS National Meeting*, Salt Lake City, March 22– 26 (2009)
6. **Orbaek, Alvin**; Crouse, Christopher A.; Barron, Andrew R. Catalysis in SWNT growth. *ACS National Meeting*, Salt Lake City, March 22– 26 (2009)
7. Colorado, Ramon; Crouse, Christopher A.; Gallaway, Clayton C.; **Orbaek, Alvin**; Barron, Andrew R. Substrate effects on the growth of single-walled carbon nanotubes (SWNTs) from iron complexes, clusters, and colloids on surfaces. Abstracts of Papers, 233rd *ACS National Meeting*, Chicago, IL, United States, March 25-29 (2007)

Invited Talks

1. **Orbaek, Alvin W.**; Behabtu, Natneal, Li Song, Horaz, Erik. *Private meeting with Texas Rep. Congressman John Culberson* (2010)
2. **Orbaek, Alvin W.** “Galactic Suite Space Hotel.” National University of Limerick, Department of Mathematics (2007).

Poster Presentations

1. **Alvin Orbaek**, Wade Adams, Andrew Barron, Pulickel Ajayan, Robert Hauge, Junichiro Kono, Matteo Pasquali, James Tour, Michael Wong, Boris Yakobson. *The Armchair Quantum Wire. Nanotechnology for Defense* Washington 2011
2. Owens, Andrew C.; **Orbaek, Alvin W.**; Barron, Andrew R. Ensemble characterization of carbon nanotube growth from various metal catalysts. Abstracts, Joint 66th Southwest and 62nd Southeast *Regional Meeting of the American Chemical Society*, New Orleans, LA, United States, December 1-4 (2010)
3. Buckyball conference poster (2010)
4. **Orbaek, Alvin W.**; Crouse, Christopher C.; Barron, Andrew R. Transition metals and growth of single walled carbon nanotubes. *North American Catalysis Society* poster presentation. Rice University. April 27 (2009)
5. **Orbaek, Alvin W.** Nanoparticle Metals effect on SWNT growth. *Presentation to Rep. Congressman John Culberson*, Rice University. Houston TX. February 18 (2009)
6. **Orbaek, Alvin W.**; Crouse, Christopher C.; Barron, Andrew R. Nanoparticles for Nanotubes. 64th Southwest *Regional Meeting of the American Chemical Society* poster presentation, Little Rock, AR, United States, October 1-4 (2008), SWRM-423.
7. **Orbaek, Alvin W.**; Owen, Andrew C.; Barron, Andrew R. Nanoparticle metals effect SWNT growth. *Air Force Nanotube Collaborator* meeting posters presentation. Dayton OH. October (2008)
8. **Orbaek, Alvin W.**; Barron, Andrew R. SWNT-Cat chemistry from wet to dry chemistry. *Air Force Nanotube Collaborator* meeting poster presentation. Dayton OH. November (2007)

Additional Publications

1. **Orbaek, A.**; McHale, M.; Barron, A. Silver Nanoparticles: A Case Study in Cutting Edge Research, *Connexions* <http://cnx.org/content/m19597/1.11/>, Aug 27, 2009
2. **Orbaek, A.**; Barron, A. ICP-AES Analysis of Nanoparticles, *Connexions* <http://cnx.org/content/m22058/1.18/>, Jul 7, 2009
3. **Orbaek, A.**; Barron, A. ICP-AES Analysis of Nanoparticles, *Connexions* <http://cnx.org/content/m22058/1.18/>, Jul 7, 2009
4. The Happy Heart Cookbook. Self published work. 1991
5. Stories for Children. Sunday Spirits/The Telling Voice newspaper. 1992 - 1993

Academic Service

Rice University, Houston TX

CBEN Outreach officer

September 2010 – August 2011

Coordinated and planned numerous outreach activities in the greater Houston area. In particular partook in a number of events related to Nanodays at the Children's Museum of Science. Presented to several groups of high school teachers to demystify nanotechnology enabling them to explain the subject in their classrooms. Coordinated outreach prospects throughout campus and off campus opportunities. Invited guest speaker Prof. Cyrus Moody to discuss ethics in science, and the interdisciplinary nature of science and nanotechnology. Assisted with regular bi-weekly meetings.

REU instructor for module on "Ethics in Research"

Summer 2008

Prepared class materials and led discussion with 12 REU summer students on the ethical aspect of scientific research. This was taught in conjunction with Prof. Cyrus Moody, and Prof. John Hutchinson. Teaching period consisted of 8 weeks.

Silver nanoparticle undergraduate general chemistry curriculum

2008 - 2011

Created lab protocol to teach and demonstrate chemistry through the use of silver nanoparticle synthesis. Module was incorporated into teaching curriculum for three consecutive years, teaching 1000+ students with a success rate greater than 80%.

Teaching Assistant

2007-2010

Provided pre-lab instruction, guided students in the laboratory, and graded lab reports for the Freshman Chemistry course. Work included setting pop quizzes, delivering pre-lab presentation and discussion. Supervision of students (30), demonstration of laboratory exercise and maintenance of safe working environment.

CBEN Summer Academy Instructor

Summers 2007 - 2009

Instructed 25 high school students in a research project including fieldwork, laboratory analysis, and interpretation of results for the Center for Biological and Environmental Nanotechnology, under the guidance of Prof. Mary McHale.

Teacher's Nano-Workshop Instructor

2008 & 2009

Discussed, demonstrated and supervised the synthesis of nanomaterials including ferrofluid, liquid crystals, and my own course based on the synthesis of silver nanoparticles.

Project SEED mentorship

2009 - 2011

Summer research program developed by American Chemical Society to encourage underprivileged and minority students to work in the chemistry lab. Have taught two students each summer for an eight week summer period, for three consecutive years. Projects ranged from silver nanoparticle synthesis and application toward Protein Crystallization, and Diels-Alder catalysis using silver nanoparticles. Students were taught to make nanoparticles, and then they were given individual projects such that they can engage in the research atmosphere by taking control of their own respective research project.

Mentoring of High School Teacher

Summer 2008

Spent one summer teaching a high school teacher to make silver nanoparticles. Assisted teacher to develop teaching protocol for use in their respective class.

Mentoring of individual students

- Neerja Aggarwal. Research related to synthesis of carbon nanomaterials. Her project was accepted to the Intel International Science Fair 2011 & 2012. She won 3rd prize in chemistry in 2012. 2010 to present
- Saba Sharafkhaneh . MWNT synthesis. 2011 - 2012
- Nanotube Separations. Managed team of five students in a project involving the separation of single walled carbon nanotubes. Project lasted for a period of 9 weeks. 2011
- Andrew Frewer. Research the use of silver nanoparticles with respect to the physics of light-matter interaction and shape control. May – July 2010

Deloitte S₂G, Barcelona, Spain

Dedicated Training Instructor, Wroclaw, Poland

2005

Upon migration of tasks to Poland it was my responsibility to develop curriculum to train and test new recruits working in Poland. In this role I spent several months conducting online training by use of NetMeeting. Towards the end of the migration I then spend three weeks in Poland training over 50 employees of Hewlett-Packard.

Training Coordinator

2003-2005

Responsible for training of new employees toward the successful completion of Accounts Payable tasks. This required detailed knowledge of country specific accounting practices for the EMEA (Europe, middle east, Middle East and Africa) regions.

National University of Ireland Galway, Galway, Ireland

Teaching Assistant

2003

Assisted with teaching and demonstration of laboratory exercises taught to second year college students of the Department of Physics.

Outreach Activities

University of Saint Tomas

November 2011

Taught two one-hour 'Silver Nanotechnology' classes at the University of Saint Thomas.

Dulles High School.

August 2011

Taught one silver nanotechnology extra credit course for summer school students of Dulles highschool.

Hightower High School

2010 - 2011

Taught silver nanotechnology class to students at Hightower high school.

Children's Museum of Houston

2009 - 2011

I presented a guest lecture on advancements of Nanotechnology to a group of high school teachers. Additionally I have been heavily involved with Nanodays, and Machine factory, two outreach initiatives run by the museum in which I coordinated efforts in conjunction with CBEN. I also partook in "nanotechnology pantomime" with Prof Douglas Natelson, then led a questions and answers session with audience about the advent of nanotechnology.

Sally Ride Science Fair

August 2010

Led tours of Rice University campus for female high school students. Guiding students through laboratory space and highlighting the Buckyball history and the significance of Rice University in the history of chemistry.

Selected News and Press Release Items

1. Barron lab intern repeats win at Houston science fair
 - o <http://news.rice.edu/2012/03/27/barron-lab-intern-repeats-win-at-houston-science-fair/>
2. Rice Graduate Student Association and Student Association research mixer
 - o <http://www.media.rice.edu/media/NewsBot.asp?MODE=VIEW&ID=16245>
3. Looking at Energy Future with Nanotechnology:
 - o <http://www.myfoxboston.com/dpp/news/local/110714-looking-at-energy-future-with-nanotechnology>
4. 'Amplified' nanotubes may power the future Rice University lab bulks up raw materials for highly efficient electric grid
 - o <http://www.media.rice.edu/media/NewsBot.asp?MODE=VIEW&ID=15950>
5. Road safety system drives Irish team to tech success
 - o <http://www.irishexaminer.com/world/kfgbkfkfidcw/rss2/>
6. Barron Lab helps high schooler earn top science prize
 - o <http://www.media.rice.edu/media/NewsBot.asp?MODE=VIEW&ID=15678>
7. The Way I See It: SEEDs of success. High schoolers get a taste of real science during summer in Rice nano lab
 - o <http://www.media.rice.edu/media/NewsBot.asp?MODE=VIEW&ID=14619>
8. Summer school supreme. High schoolers don lab gear for Project SEED at Rice
 - o <http://www.media.rice.edu/media/NewsBot.asp?MODE=VIEW&ID=12769>
9. 10 questions for...Alvin White Orback

- <http://www.rte.ie/news/2007/0830/orbaeka.html>
- 10. Pint of the 'black stuff' to breach the final frontier
 - <http://www.independent.ie/national-news/pint-of-the-black-stuff-to-breach-the-final-frontier-1066313.html>
- 11. We're all going on a space holiday . . . if you've got 2.9m to spare
 - <http://tribune.maithu.com/article/2007/aug/19/were-all-going-on-a-space-holiday-if-youve-got-29m/>

Selected Videos and Online Presentations

- Armchair Quantum Wire By Using Amplification of Nanotubes - Alvin Orbaek
 - <http://vimeo.com/20804491>
- Chemistry with Alvin. Welcome to the Barron Group at Rice University
 - http://barron.rice.edu/aok_qtime.htm

Extra Curricular Activities / Interests

I enjoy reading and learning, in fact, I love to learn. I particularly enjoy books on subjects such as history, economics, politics, as well as the Classics and science and technology manuscripts. I enjoy partaking in sports and activities, mostly Aikido, Soccer, and Sailing. I have competed at several local regattas and I try to get out on the water as often as possible. I also used to play soccer where I represented county Clare, Ireland, under 16's. I appreciate music greatly so I turned to Dj'ing in order to pay for my records and vinyl.

References

Prof. Andrew R. Barron
Charles W. Duncan, Jr. - Welch Chair of Chemistry and Professor of Materials Science
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Houston, TX, 77005
Phone: 713 348 5610

Christopher E. Hamilton, Ph.D.
Research Scientist
MST-7: Polymers & Coatings Group
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