

FIRST WEBINAR

Introduction of all attendees: undergraduate or graduate students and their dream career in chemistry abroad (mainly USA)

- teaching (high school, college (some research), college with no research requirements)
- research and teaching (research intensive university vs average university, top 20 vs other universities)
- research only: National Research Laboratories, or applied research in industrial laboratory
- science writing in popular science magazines
- patent experts
- industrial (in production, technicians, quality control, research administration, etc...)

I. Careers Available for Chemists in the United States

I. A. Careers for chemists with BS and MSc degrees in the United States:

- Continuing Education (**30%**)
 - PhD or MS programs in chemistry and related disciplines: (most students receive free tuition and annual stipend) 15%
 - Health related graduate programs (medical, dental, pharmacy, physician assistant) (very little tuition assistance or stipends (less than 1%) 10%
 - MBA 5%
- Industrial Employment (**40%**)
 - manufacture, quality control, hazardous waste management, formulation chemistry
- Research in industry or research institutes (**10%**)
- Sales and Marketing (**10%**)
- Teaching high school chemistry (**5%**)
 - MSc in Education is required in public schools
- Technical Communication (**5%**)
 - Science journalists writing for general audience

I. B. Careers for chemists with PhD degrees in the United States (1/3 in industry, 1/3 in academics, 1/3 in government)

- Postdoctoral Fellowship (2-3 years)
 - Very important for future academics
- Research and teaching at the university with the PhD programs (400 in U.S.)
- Teaching and research in Colleges without PhD programs, Primarily Undergraduate Institutions, PUI (1,200 in U.S.)
 - Master's (700) and Baccalaureate (500)
 - publishable research is required from faculty
- Teaching in colleges with no research expectations (1,200)
 - Mainly community colleges awarding associate degrees
- Research and development in industry, including research management
- Research in national laboratories

II. Advantages Gained as the Graduate of UJ in Chemistry

- better preparation in mathematics and physics than most American students
 - multivariable calculus, differential equations, linear algebra
- concentration on science since early high school, including Chemistry Olympiad, leading to more self-confidence and competitive spirit
- awareness of UJ historical importance in Europe and in the World
- very well prepared (a lot of serious studying) for PhD program preliminary exams
 - approached them more seriously than most of domestic and international students
- one of the “top” MSc graduates of the best Polish university competing with diverse students from highly diverse colleges in U.S. and in the world
 - not aware of this advantage at the very beginning
 - most talented U.S. students apply to medical and dental schools, not to PhD programs (the best 1% are accepted into MD/PhD programs with no tuition with stipend) and the best students pursuing PhD degrees apply to very few most prestigious universities

SECOND WEBINAR

III. Practical Access to Employment in the United States

III.A.1. Practical access to jobs in industry (both B.S. and PhD)

- Industrial recruitment in prestigious research universities and well known baccalaureate colleges (school's reputation is extremely important)
 - Ivy League, Caltech and MIT, Stanford, UC Berkeley, UCLA, Northwestern, Chicago, Texas Austin, UI Urbana Champaign, Penn State, Wisconsin Madison
- Mentor's contacts at certain top companies
 - A job is phone call away
- Job interviews at the ACS National Meetings (twice a year)
- Industrial internships for undergraduate students
- Contacts with alumni employed at local chemical companies
 - mailing own CV to 100 companies has close to zero effect
- Industrial jobs pay approximately 30% more than academic jobs, but can be terminated at any time

III.A.2. Practical access to faculty jobs in academics for PhD chemists (multiple ads appear every year)

Salaries dependent on:

- the type of university
 - research universities pay 30% more than Primarily Undergraduate Institutions
- school endowment
 - Harvard endowment is over $30 \cdot 10^9$ dollars, average college endowment is less than $0.5 \cdot 10^9$ dollars
- school prestige
 - salaries for full professors at top ten research universities in U.S. are over \$250,000 per year (not including summer salaries) while the average at all other research universities is \$120,000 and at B.S. and MSc universities it is \$90,000

III.B.1. Job search for **tenure-track** faculty position at **Research Universities** awarding **PhD degrees** (400 in U.S.) (typically 100 candidates, 3-5 invited for the interview)

Required:

- PhD degree from a very well-known college/university resulting in several publications and *excellent* recommendations
- Postdoctoral Fellowship with a well-known professor, resulting in several publications and *excellent* recommendations
- *Multiple* publications in prestigious journals
- *Excellent* research proposal
- Good undergraduate and graduate transcripts

Helpful:

- Winning very competitive postdoctoral NSF or NIH Fellowships
 - Some well-known professors offer short funding with the expectation of future Fellowship

- Good communication skills in English are not required for the faculty job at the research university, good research proposal and the interview presentation are much more important

III.B.2. Job search for **tenure-track** faculty position at **Colleges and Universities without PhD programs, but with research requirement** for faculty (1200 in U.S.), up to 50 candidates, 2-3 invited for the interview

Required:

- PhD from very good university
- very strong recommendations from PhD and Postdoc advisors
- some publications in peer-reviewed journals
- application must include research proposal including undergraduate students, teaching “philosophy”, transcripts, some teaching experience (e.g. Teaching Assistant (TA) as a graduate student)
- Good communication skills in English are necessary here

Helpful:

- teaching experience as a lecturer and some knowledge of modern teaching methods
- realistic research proposal including undergraduate students
- reasonable startup funds

III.B.3. Job search for faculty position at **Colleges with no research requirements** (approximately 1,200 in U.S.)

- practically only community colleges (award Associate Degree after 3 years) some students transfer to colleges after 2-3 years
- low salaries (max. \$60,000 per year as the full professor)
- usually no tenure available, most are part time
- very little instrumentation available
- frequently former college professors who did not receive tenure

Final F2F Seminar

My scientific career in the United States

MSc in Chemistry with Distinction, 1980 Jagiellonian University (5.0 GPA)

Lead to one publication in *Surface Science* with Dr. Ceckiewicz (MSc advisor) as co-author, before college - Laureate of the Polish Chemistry Olympiad for high school students (1974, 1975)

Application to Georgetown University graduate school was brought from U.S. in 1980 by Dr. Jacek Grochowski, UJ employee, visiting Georgetown in 1979-81. Graduate fellowship was awarded based on UJ GPA, letters of recommendations from Professors A. Bielanski, A. Baranski, and Dr. J. Grochowski, success in the Chemistry Olympiad, and a publication in peer-reviewed journal in Western Europe. In reality, based on the personal decision by Professor Baker, Chair of the Chemistry Department at Georgetown, despite opposition by other Georgetown Chemistry faculty.

Time to study English (February 1981-July 1981 (studied German and Russian in school)).

Graduate Student in Chemistry at Georgetown University in Washington D.C. (1981-1987)

Passed all four Phase I graduate entry exams as the only foreign graduate student and only one of two all other students (25). Took eight advanced graduate courses which required more time commitment and intellectual effort than any advanced undergraduate chemistry course in Poland (Final GPA 4.0 = A)

Teaching Assistant in General Chemistry, 1982-1984

Lecturer in General Chemistry, 1985-1987

Research on electron distribution and electron transfer kinetics in reduced polyoxotungstates

PhD in Chemistry with Distinction, 1987 Georgetown University, Washington, D.C.

PhD Thesis: "Multinuclear NMR Investigation of Electron Transfer Rates in Heteropoly Blues"

Nine publications in peer-reviewed journals (*J. Am. Chem. Soc.*, *Inorg. Chem.*)

1987-1989 Postdoctoral Fellowship, Brookhaven National Laboratory, Upton, NY

Research in physical chemistry at the National Laboratory, working for world renowned physical chemist (Norman Sutin) using picosecond time resolved emission of organometallic compounds to determine solvent dynamics contribution to electron transfer rates in various solvents. In addition, carried out the first measurements ever for electron transfer rates in the "inverted region" confirming R. Marcus's theory. Five publications in peer reviewed journals, including an article in *Science*, quoted today in many Advanced Inorganic Chemistry books.

1989-90: Tenure-track faculty position at major research university (SUNY, University of Buffalo)

Searching for faculty position I applied mainly to research universities with PhD programs, based on mentor's recommendation and strong support by Professor Harry B. Gray from Caltech ("Harry the Great") who attended my presentation at the National ACS Meeting. Interviewed by seven universities, received three offers.

Resigned after one year, because of preference for a position where both teaching and research (not research only) were valued.

1990 - to date: Faculty at the Canisius College in Buffalo, NY (a perfect match!)

Assistant (1990-96), Associate (with tenure) (1997-2000) and "Full" Professor (2001-to date) of Inorganic Chemistry and Department Chair for five terms (2003-2017)

Teaching:

General (two levels), Inorganic, Organometallic, and Bioinorganic Chemistry, Student Seminars based on current research publications, supervision of summer undergraduate research (student stipends funded by the departmental endowment, accumulated through the Chair's fundraising campaign including recent Canisius Chemistry and Biochemistry graduates)

Research:

Structures and applications of transition metal substituted polyoxotungstates as catalysts for carbon dioxide activation and computations of 31-P NMR chemical shifts for paramagnetic polyoxotungstates. Research led to seven publications as the corresponding author in prestigious journals (*Inorg. Chem.*, *J. Phys. Chem.*, *J. Chem. Ed.*). The publication in *J. Chem. Ed.* concerning explanation of "Golden Penny Experiment" is quoted *in toto* in some General Chemistry textbooks as an example of the unusual electrochemical driving force. Research supported by grants as Primary Investigator from NSF, Research Corporation, NIH, two local chemical companies (Honeywell and Occidental) totaling \$600,000 and co-investigator in grants to purchase research instrumentation totaling \$700,000.

In thirty years supervised research of over 30 undergraduate students, who continued their education at prestigious universities (Yale, Princeton, MIT, Caltech, Northwestern, Texas, UC Berkeley) and later became professors at research universities and prestigious medical schools (Duke), MDs in many Buffalo hospitals, employed in R&D at various major chemical and pharmaceutical companies, as well as patent lawyers.

Instrumentation used in research:

400 MHz multinuclear NMR instrument, PAR Potentiostat (for CV and Electrolysis), IR/Raman, UV/VIS, Fluorimeter, ICP MS, GCMS, LCMS, KF Coulometer, HPLC, CE, TG and DSC Calorimeter, high vacuum line, Schlenk line, controlled atmosphere "dry box", access to super computer at Buffalo Supercomputing Center

Awards at Canisius College:

- Kenneth L. Koessler Distinguished Faculty Award, 2000
- Oishei Professorship 1999 – 2002 and Peter Canisius Distinguished Professorship 2003-2006
- Science Teachers Association of New York State Section Service Award, 2011
 - for the organization of National Chemistry Olympiad in WNY