

## Overview

*Going forward, I would like to transfer my semiconductor/data knowledge to additive manufacturing, gene therapy, artificial intelligence, or applied neuroscience themes.*

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Given the privilege, my degrees in Chemical Engineering and Physical Chemistry, along with a solid research background in Materials Science, provide ample experience to perform the duties required of this position. Most semiconductor projects I encountered, involved either processing or characterization, so I am strong in both areas.

With over 20 years as a Research Scientist, I have coauthored roughly 16 papers, half under the direction of John Haggerty at MIT, and the remainder with support from Klaus Bachmann at NC State. During the course of research, I have: (1) grown the first laser-induced, chemical vapor deposition, amorphous silicon solar cells, (2) developed a microwave plasma, chemical vapor deposition system, to create polycrystalline diamond from methane gas, in a regime where kinetics dominates over thermodynamics, (3) monitored the surface evolution of compound semiconductor heterostructure films, in a chemical beam epitaxy system, with plane polarized reflectance spectroscopy, pioneered by our research group.

In more recent years, I plunged into the world of macroeconomics, human behavior, and statistical analysis, through futures trading. Using quantitative investment strategies, participants seek high probability trades. To handle market data, I applied digital signal processing techniques, in the spirit of John Ehlers, an Electrical Engineer from Raytheon. Along the way, I combined statistics with digital signal processing to produce highly responsive indicators, enhancing trade signal clarity. By immersing myself in the data science of financial markets, and backtesting of trading strategies, I have improved my computer programming skills, and established more techniques to deal with data interpretation.

Going forward, I would like to transfer my semiconductor/data knowledge to additive manufacturing, gene therapy, artificial intelligence, or applied neuroscience themes. I invite you to visit my personal website to view current literature and computational projects. If you have any concerns, feel free to contact me.

*Christopher J Harris*

## Christopher J Harris

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### Profile

*Chemical Engineer* seeking a Process Engineer, Quality Engineer, Application Engineer, or Data Scientist role, leading to a Chief Technology Officer position:

crystal growth	plasma chemistry	gene therapy
surface science	laser excitation	applied neuroscience
chemical vapor deposition	optical characterization	computer modeling
molecular beam epitaxy	electrochemical methods	statistical analysis
semiconductor devices	additive manufacturing	process control

### Thesis

*Real Time Reflectometry of Ga-based Compound Semiconductor Films on Silicon during Plasma Enhanced Molecular Beam Epitaxy*, NCSU Materials Science Dept: **1999**.

### Clifton Strengths

### Character

<i>Strategic</i>	faced with any given scenario, can quickly spot the relevant patterns.
<i>Learner</i>	have a great desire to learn and want to continuously improve.
<i>Ideation</i>	able to find connections between seemingly disparate phenomena.
<i>Futuristic</i>	inspired by the future and what could be.
<i>Self-Assurance</i>	possess an inner compass yielding confidence in decision making.

### Experience

*Engineering Consultant*, Independent (1/18 to present)

- Compose webpage content to demonstrate work skills.
- Search for commercial contracts through staffing firms and freelance websites.

*Futures Trader*, Independent (9/06 to present)

- Shift from fundamental evaluation of stocks to technical analysis of futures.
- Combine statistics with digital signal processing to produce indicators with better trade signal clarity

*Research Assistant*, Maine Chemistry Dept: Orono, ME (8/03 to 5/06)

- Apply cyclic voltammetry to find catalytic activity in gold compounds for methanol oxidation.
- Induce electrochemiluminescence in a ruthenium compound for DNA analysis.

*Teaching Assistant*, Rutgers Chemistry Dept: New Brunswick, NJ (1/00 to 1/03)

- Present lab techniques to students in General Chemistry up through Physical Chemistry.
- Pass the cumulative exam, the written portion of a PhD degree.

*Research Assistant*, NCSU Materials Science Dept: Raleigh, NC (1/87 to 5/99)

- Develop a microwave plasma, chemical vapor deposition system, to create polycrystalline diamond from methane gas, in a regime where kinetics dominates over thermodynamics.
- Achieve a unique ellipsoidal plasma advantageous for film growth over spherical plasmas.
- Design a radio frequency nitrogen plasma source for GaN film growth.
- Monitor the surface evolution of compound semiconductor heterostructure films, in a chemical beam epitaxy system, with plane polarized reflectance spectroscopy.
- Derive substrate temperature from plane polarized reflectance intensity.

*Research Specialist*, MIT Advanced Energy Materials Lab: Cambridge, MA (11/84 to 1/87)

- ▶ Invent a new approach for process control to optimize laser power.
- ▶ Write a Pascal based data acquisition program for DOS environment in 1986, long before LabView enters the Windows market.
- ▶ Analyze optical signals from a ceramic powder reaction chamber, leading to a computer monitoring scheme, which replaces a human operator.
- ▶ Construct interferometer to measure film thickness, providing a realtime signal, to calibrate growthrate.
- ▶ Refine process control loop to stabilize laser power, producing a steady deposition rate with reliable material properties.
- ▶ Collect in-situ stress measurements of growing films, through deflection of an optical laser, as sample curvature evolves.
- ▶ Grow the first laser-induced, chemical vapor deposition, amorphous silicon solar cell.

*Stock Investor*, Independent (5/84 to 9/06)

- ▶ Evaluate fundamental aspects of technology and phamaceutical sectors.
- ▶ Choose lucrative issues, including initial pubic offerings, IPOs, based on semiconductor knowledge, similar to a venture capitalist.

## Intern

*Mass Field Station*: Waltham, MA (5/83 to 8/83)

Grow vegetables on sewage sludge layers to determine plant uptake of heavy metals.

*International Paper*: Camden, AR (5/82 to 8/82)

Apply quality control principles to glossy file folder stock in a papermill process.

*Sun Oil Company*: Main Pass, LA (5/81 to 8/81)

Perform system maintenance, technical evaluation on an offshore oil & gas production platform: MP-293A.

*Sun Oil Company*: Snyder, TX (5/80 to 8/80)

Explore gas compressor repair, plant process control on a cryogenic natural gas processing facility.

## Literature

*Real-time Monitoring of Surface Processes by P-polarized Reflectance*, J. of Vacuum Science & Technology: **1997**, A15, 807.

*Molecular Layer Epitaxy by Real-time Optical Process Monitoring*, Applied Surface Science: **1997**, 112, 38.

*Boron Incorporation in Hydrogenated Amorphous Silicon Films Prepared by Chemical Vapor Deposition*, J. of Noncrystalline Solids: **1987**, 97, 1419.

*Laser-induced Chemical Vapor Deposition of Hydrogenated Amorphous Silicon: Photovoltaic Devices and Material Properties*, Solar Cells: **1987**, 21, 177.

## Education

MS <i>Physical Chemistry</i>	Rutgers: New Brunswick, NJ	Jan 2003
MS <i>Material Science</i>	North Carolina State: Raleigh, NC	unofficial
BS <i>Chemical Engineering</i>	Texas A&M: College Station, TX	May 1984
HS <i>Diploma</i>	Waltham High: Waltham, MA	Jun 1979

## Certificate

<i>Computational Investing</i>	Georgia Tech: Coursera	Dec 2014
<i>Computational Neuroscience</i>	Washington: Coursera	Jul 2015
<i>Data Scientist's Toolbox</i>	Johns Hopkins: Coursera	Mar 2015
<i>Python Programming for Everybody</i>	Michigan: Coursera	May 2015
<i>Data Analysis and Statistical Inference</i>	Duke: Coursera	May 2015

## Honor

*Bausch & Lomb Science Award*