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Technical Consultant/Scientist

WVU - Tech, USA

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Lab experience,

More than 10 years of laboratory research experience in organic/inorganic/polymer films/gels/colloids composites applied to nano- & micro coats using plasma etch and robotic deposition systems. Hold a PhD (USA) in Analytical Chemistry, MSc (Canada) in Physical Chemistry, and BSc (UK) in Analytical sciences.

Hands on experience on substrate dry/wet etching: (i) used plasma etcher/cleaners (e.g. Harrick Plasma) to apply dry etching/cleaning on cut Silicon[100] wafers, glass & polymer slides, and metal sheets with control of vacuum pump. Any surface modification/ functionalization to apply RIE/PECVD on ultrathin films on substrates done through multi-valve gas flow system using gas cylinders/regulators/valves.

(ii) Wet etching/cleaning (e.g. H_2SO_4/H_2O_2 , Aqua-regia, NH_3/H_2O_2 ...) is applied to ceramic, glass, or patterned substrates.

(iii) Design and assembly of "Automated flow deposition system" that control the flow of different fluids (gases, liquids) in and out of deposition chamber, sprayers, or capillary tubing. Automation made through programming (VB code), solenoid valves, circuit boards, tubes, reservoirs, ..etc.

(iv) Used robotic deposition system under software control to program number of layers deposited.

(v) Vapor deposition on substrates using Thermal & Sputter UHV/MVD system. Operation of diffusion/turbomolecular pumps, Quartz crystal microbalance to monitor thickness of thin films.

Hands on experience on materials synthesis/formulation, film deposition/patterning:

(i) Macromolecular (polymers, polyelectrolytes, proteins, ...etc.) patterns or films on surfaces;

(ii) Molecular (organics, surfactants, ...etc.); salts (inorganics, minerals);

(iii) Ceramics (crystals, wafers, powders, ...etc.),

(iv) Gels (microcapsules, membranes, coatings, nano- & microfilms/patterns, ..etc.).

Characterization constitute elucidating:

(i) structural properties of chemical formula, polymer film thickness/pattern, polymer/powder matrix, powder matrix,

(ii) crystallography (solid state, topography contrast, phase contrast),

(iii) particle size and surface potential, (v) hydrophobic character, shore, stress/strain,

(iv) electrochemical, electrochromic, and optical properties.

Instruments used in surface characterization:

(i) Plasma etch/activation system: etch/clean/functionalize of substrates or thin films.

(ii) Electrochemical/ Electro-analytical techniques (i.e. Cyclic/Pulse Voltammetry, ISE, AS, DMM, SFA, AC impedance, Potentiostat, Electro-plating/polishing, Oscilloscope, and electronic board design)

(iii) Optical spectroscopy techniques (e.g. UV-Vis, FTIR, ATR-FTIR, RAMAN, XRFS ... etc),

(iv) Surface probe techniques (e.g. SEM, ESEM, TEM, EDX, AFM, XPS, Profilo-M., Ellipso-M., etc.),

(vii) Rheology (Zeta potential & particle size, BET, DSC/TGA/DTG, LS, R.I., Viscometer, Stress/Strain),

(viii) Contact angle, Polarimetry, and UHV systems.

Other Instruments used in materials characterization:

- (i) Atomic spectroscopy (e.g. ICP-OES, ICP-MS, AAS, ... etc.),
- (ii) Chromatography (e.g. GC, HPLC, IC, GC-MS, GC-FTIR, GPC, ...etc.),

Software skills

-Programmer Microsoft Visual Basic (VBA, VB.net) and Visual Studio (VS) 2010-2017 Express platforms. Code/Software know how: C#, MATLAB, Lab-View (NI-DAQmx), Statistical analysis, Smart-Draw.

Model-Based Engineering (Heat Transfer & Mass transport): Monte Carlo Algorithm/diffusion laws to simulate complex diffusion mechanisms of molecules/ions/atoms across complex matrices (i.e. thin films, fluids, ...).

Used Finite Element Numerical analysis to simulate thermal/neutron diffusion across hot melts/reactor walls. (2D simulations using Visual Basic 2015/FORTRAN)

- Proficient in Microsoft office (Word, Excel, PowerPoint, ...). Endnote, Notepad, Paint, ...
- Manuscript, chemical structure, chemical property, spectroscopy search Sci-Finder/Web-of-science/ACS/NIST, ... others.
- Manuscript, preprints, and proposals write up and submission (NSF, DoD, PRF, ...etc.).
- Patent search/filing/law USPTO, WIPO

Management: Led technical programs in multiple research projects and research collaborations. Experience with project planning, prioritization of critical agenda, plus manage multiple, complex, and time-sensitive projects. Obtained HAZMAT/HAZWOPER certificate to work in Labs per OSHA/university policy regulations

EDUCATION

- 2005 Massachusetts Institute of Technology (Paula Hammond) Cambridge, MA
Post doctorate, PEM Fuel cells, "DESIGN & FABRICATION OF SOFT FUEL CELL MODULES"
- 2002 Florida State University (Joseph Schlenoff) Tallahassee, FL
PhD in Analytical Chemistry, Title of Thesis: "ION TRANSPORT IN POLYELECTROLYTE MULTILAYER MEMBRANES: ELECTROCHEMICAL, SPECTROSCOPIC, AND COMPUTATIONAL ANALYSIS"
- 1993 University of Victoria (David Harrington), Victoria, BC, CANADA
MSc in Electrochemistry, Title of thesis: "KINETICS OF HYDROGEN & IODINE UNDER POTENTIAL DEPOSITION ON POLYCRYSTALLINE PLATINUM"
- 1990 University of Greenwich (Thames Polytechnic), London, UK
BSc, "Analytical Sciences/Physical Chemistry"
- 1986 West Thames College (Hounslow Borough College), London, UK
GCE A-levels, Chemistry-Physics-Biology
- 1983 National Evangelical Institute, Sidon, Lebanon
Baccalaureate (LB), Experimental Science

PROFESSIONAL EXPERIENCE

- 5/2019 – present **Academic Lab Manager, WVU-Tech, Beckley, WV, USA**
Lab prep-work mainly for physical sciences and chemical engineering laboratories with occasional teaching. Devise new Lab methods and installation of new Lab equipment.
- 1/2018 – 5/2018 **Visiting Chemistry Faculty (Lecture/Lab), West Virginia University, Keyser, WV, USA**
Taught combined lecture and lab courses in General Chemistry (Gen Chem (I & II)), (b) Taught Organic Chemistry Lab, (c) Organic Lab setup and stockroom chemicals prep.
One semester contract
- 8/2016 – 6/2017 **Chemistry Faculty (Lecture/Lab), Pennsylvania State University, Fayette, USA**
Taught combined lecture and lab courses in General Chemistry (Gen Chem (I & II)), (b) Energy/Environmental Engineering, Molecular science.
End of one-year contract
- 6/2015 – 8/2016 **Chemistry Faculty (Lecture/Lab), Southwest Tennessee Community College, Memphis, USA**
Taught combined lecture and lab courses in General Chemistry (Gen Chem (I & II)). (b) General Chemistry Lab setup and stockroom chemicals prep.
Seeking full time job
- 5/2007 – 10/2016 **Scientific Consultancy in Project and Technology Development**
Industrial and Pilot plant process design related to Process simulations
- 8/2011 – 9/2012 **ENGSL Minerals DMCC, Dubai, UAE**
- 9/2015 – 10/2016 **HBFULLER, St. Paul, MN**
Created Software to study heat conduction in hot melts or complex matrices. Finite element numerical analysis. Simulation VB 2010-2015 platforms.
Designed and operated metal/chemical waste processing pilot prototypes to capture CO₂ gas for mineralization. Supervised online/onsite make-shift research Labs related to waste processing. Generated technical diagrams of industrial schemes (i.e. PFDs and PIDs) with focus on reactions mass/energy balance, control philosophy protocols, and industrial hardware (sensors, evaporators, materials compatibility, etc.).
- 8/2005 – 8/2011 **University of Memphis, Memphis, TN**
Assistant Professor, Analytical Chemistry
(End of contract - No tenure)
- Taught courses at the undergraduate and graduate levels in analytical, materials, and general chemistry. Supervised and provided research projects to graduate & undergraduate students. Equipped my university lab with at least 10 different spectroscopy and surface techniques to serve my research. Published papers in many peer reviewed journals on topics that concerns separation, materials, and electrochemical science.*
- 1/2003-7/2005 **Massachusetts Institute of Technology, Cambridge, MA**
Research Associate, Chemistry/Analytical Materials
End of two-years contract
- Studied and applied layered polyelectrolyte technology to the design of membrane electrode assembly in fuel cells (i.e. PEMFC) and galvanic cells.*
- 8/1999-12/2002 **Florida State University, Tallahassee, FL**
Research Assistant, Chemistry/Analytical Materials

Studied and characterized ion transport on specialty surface coatings using computer simulations, electrochemical, surface, and analytical techniques. Films are polyelectrolytes deposited on metallic and ceramic substrates.

MEMBERSHIP Member of The American Chemical Society since 1999 - Present

Language proficiency: *Excellent in English and Arabic*

Activity: Sports (Swimming, Soccer, Volleyball), watch documentaries (socioeconomic, political, and environment), Education, (*not a subscriber to any social media outlet)

SELECTED PUBLICATIONS

Farhat, T.R., "Numerical Analysis of Heat Transfer using "Sequential Transformation by Regression Factors" method, *United States Copyright office, #TXu 2-038-442, Jan, 31st, 2017.*

Farhat, T.R., "Fluorinated Hydrogen Bonded Electrolytes of PVA/Nafion® and PAH/Nafion® Complexes, Electrochemical Applications", *ACS Book Chapter "Surfaces and Colloids", Chapter 7, pp 105–116, ACS Symposium Series, Vol. 1070, 09/ 19, 2011.*

Daniel G. Abebe, **Farhat, T.R.**, "Self-assembly of Nafion®/poly (vinyl alcohol) at pH = 1.2 and Nafion®/poly (allyl amine) at pH = 11, *Soft Matter, 2010, vol.6, issue 6, pp. 1325.*

Mamidi, Sai Sree; Meas, Bo; **Farhat, T.R.**, "Rotational Hydrodynamic Diffusion System To Study Mass Transport Across Boundaries". *Analytical Chemistry 2008, 80(21), 8109-8114.*

Farhat, T.R., "Layer-by-Layer Assembly of Electroactive Thin Films to Layered Carbon Electrodes", *Review Dekker Encyclopedia for Nanoscience and Nanotechnology 2nd Edition, 24, March 2009*

Farhat, T.R.; Hammond, P.T. "Engineering Ionic and Electronic Conductivity in Polymer Catalytic Electrodes Using the Layer-By-Layer Technique", *Chemistry of Materials, 2006, 18(1), 41-49.*

Farhat, T.R.; Hammond, P.T. "Fabrication of "Soft" Membrane Electrode Assembly Using Layer-By-Layer Technology", *Adv. Func. Mater., 2006, 16, (3), 433-444.*

Farhat, T.R.; Hammond, P.T. "Designing A New Generation Of Fuel Cells Using Layer-By-Layer Deposition Of Polyelectrolytes," *Adv. Func. Mater., 2005, 15, 945.*

Farhat, T.R.; Schlenoff, J.B. "Doping Controlled Ion Diffusion in Polyelectrolyte Multilayers, Mass Transport In Reluctant Exchangers". *Journal of the American Chemical Society, 125(15), 4627-4636, 2003.*

Farhat, T.R.; Schlenoff, J.B. "Corrosion Control using Polyelectrolyte Multilayers" *Journal of Electrochemical Society, Solid-State Lett.* **5**, B13, **2002.Science News** online, "Steely Glaze: Layered electrolytes control corrosion", www.sciencenews.org/articles/

Farhat, T.R., Schlenoff, J.B "Ion Transport and Equilibria in Polyelectrolyte Multilayers" *Langmuir* **2001, 17(4), 1184-1192.**

USA PATENTS: (shared with academic and industrial sectors as inventor but no ownership)

1. Apparatus for automatic depositing of multiple ultra-thin layers using layer-by layer deposition and method for using the same *From U.S. Pat. Appl. Publ. (2010), US 20100323106 A1 20101223, Language: English, Database: CAPLUS*

2. Layer-by-layer technology fabrication of carbon-polymer electrochemical systems
From U.S. Pat. Appl. Publ. (2006), US 20060062982 A1 20060323, Language: English, Database: CAPLUS

Selected SPEAKING ENGAGEMENTS & PRESENTATIONS

Farhat, T. R., *Abstracts of Papers, 229th ACS National Meeting, San Diego, CA, United States, March, 13-17, 2005.*

Farhat, T. R., "Materials Aspects of fuel cells", *The MRS National Meeting, Symposium M, Boston, Massachusetts, December 2, 2004.*

Farhat, T. R., *The ACS National Meeting (Division of Colloids and surfaces), Anaheim, California, March, 28, 2004.*

Farhat, T.R., "Computer Aided Learning in Chemical Education with Emphasis on Quantitative Methods" *Abstracts of papers of the American Chemical Society, National Meeting, 2004, Division of Chemical Education.*