

## Biographical Sketch

AHMED A. FARGHALY, Ph.D.



VCU



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**Career Objective: To be a full Professor totally involved in research and teaching.**

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### Academic Education

1. Ph.D. (*Nanoscience & Nanotechnology*) Chemistry Department, Virginia Commonwealth University, Richmond, Virginia USA. May 2016.  
Dissertation title "Fabrication of Multifunctional Nanostructured Porous Materials".  
Advisor: Prof. Maryanne M. Collinson ([mmcollinson@vcu.edu](mailto:mmcollinson@vcu.edu)).
2. M.Sc. (*Inorganic Chemistry*) Chemistry Department, Faculty of Science, Assiut University, Assiut, Egypt February, 2008.  
Thesis title "Transition Metal Complexes of Some Ligands Containing Triazole Nucleus".  
Advisor: Prof. Said A. Ibrahim ([saidib@aun.edu.eg](mailto:saidib@aun.edu.eg) and [saidibrahim7@yahoo.com](mailto:saidibrahim7@yahoo.com)).
3. B.Sc. (*Chemistry*) with Honors Degree, Assiut University, Egypt June, 2001 [Top Senior among my colleagues ~ 100, this based on the cumulative scores I collected during my 4-year B.Sc.].

### Professional Appointments

1. Lecturer of Inorganic Chemistry: **Tenured position**, Chemistry Department, Assiut University, September 2016 till now.
2. Graduate Teaching and Research Assistant: Chemistry Department, Virginia Commonwealth University, August 2010- May 2016.
3. Associate Lecturer: Chemistry Department, Assiut University, April 2008- July 2010
4. Teaching and Research Assistant: Chemistry Department, Assiut University 2001- March 2008.

### Mentorship of Undergraduate Students at VCU

1. Hajira Choudhary ( 2 years )
2. Mai Lam (1.5 years)
3. Monica Jeyasankar (one semester)
5. Maram Abdel Razeq (one semester)
5. Robert Szymczak (one semester)

### Projects

1. DOE React (Rare-earth free permanent magnets) 2011 –2013. Design and synthesis of rare-earth free carbide based permanent magnet materials through various synthetic methods.
2. FASCDP Project for "Development of the Faculty of Science, Assiut University, Egypt".

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3. DONACC Project: "Development of New Analytical Chemistry Curriculum in the Faculties of Science in Upper Egypt".

## **Research Experience**

1. Developed new single-potential-step electrodeposition routes for the synthesis of single phase  $Pt_x-M_y$  (M: none noble metal) binary alloys, conducting polymer-silica-metal nanocomposites, and metal-silica nanocomposites.
2. High surface area nanoporous platinum, palladium and gold electrodes/catalysts with different morphologies for electrochemical sensing in complex biological environments (e.g. blood) and electrocatalysis applications were obtained by applying chemical etching /dealloying. Free-standing pure and hybrid conducting polymer thin were obtained by chemical etching of the conducting polymer-silica nanocomposites.
3. The polymer-silica-metal nanocomposites' synthesis strategy was expanded to form conducting polymer- metal oxide, sulfide, and phosphate nanocomposites in absence of any applied potential and at room temperature. The resulting materials could serve as potential electro- and photoelectro-catalysts for energy applications (e.g. supercapacitor, fuel cells, batteries and water splitting).
4. Developed cheap and transparent nanoporous gold electrodes for electrochemical sensing applications using very small sample volumes (subnanoliter droplets).
5. Demonstrated that nanoporous noble metal electrodes have a superior electrochemical sensing behavior in complex environments (e.g. presence of biofouling agents).
6. Demonstrated the synthesis of high surface area metal nitride electrodes for electrochemical sensing and energy applications by using the oblique angle deposition technique.
7. Discovered a new digestive repining agent, a mixture of supercritical fluids that can reduce the size of the magnetic metal oxides nanoparticles in a one-step one-pot process.
8. Developed a method for the synthesis of a variety of iron carbides nanoparticles.
9. Developed supercapacitor electrodes from lignin biomass.
10. Studied the catalytic activity of platinum and palladium aerogels toward the electro-oxidation of alcohols.
11. Participated in the development of flexible and biodegradable silk-based electrochemical sensors.
12. Skillful in the synthesis of polystyrene spheres for the preparation of colloidal crystal templates that can be used to prepare nanoporous metal electrodes/ catalysts.
13. Skillful in metal nanoparticles (e.g. Fe, Co, Ni, Au, Ag,  $M_xO_y$ ,  $M_xC_y$ , alloys, core-shell etc) synthesis using the polyol, chemical reduction, reverse micelle, and other techniques.
14. Skillful in controlling the morphology of the magnetic and none-magnetic nanoparticles through the application of a magnetic field.
15. Skillful in the synthesis of magnetic palladium nanoparticles catalyst for C-C coupling reactions.
16. Skillful in running reactions at high temperature and pressures using toxic and flammable gases (e.g. CO and H<sub>2</sub>).
17. Demonstrated the synthesis of metal nanoparticles/nanorods (e.g. Cu,  $Cu_xO_y$  and  $Fe_xO_y$ ) using supercritical fluids in a high pressure reactor.
18. Skillful in the large scale synthesis of nanoparticles using pilot plant (e.g. 10 g cobalt carbide).
19. Skillful in the synthesis of polymers, organic and coordination compounds. For example, the synthesis of hyperbranched polyethylene polyline, polystyrene spheres, triazole thiols and their metal complexes.

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### **Technical Skills: Material Characterization at Chemistry Department and Nanomaterials Core Characterization Facility, VCU, Richmond, VA**

Expert in materials characterization using the following techniques:

Cyclic Voltammetry, Potentiometry, Open Circuit Potentiometry (OCP), Chronoamperometry, Galvanostatic Charge-Discharge, Impedance Spectroscopy, Oxygen Reduction Reaction (ORR), X-ray Diffraction (XRD), X-ray data processing using High Score Software, Vibrating Sample Magnetometer (VSM), Energy-dispersive X-ray spectroscopy (EDS), X-ray photoelectron spectroscopy (XPS) and data processing using CASA software, Inductively Coupled Plasma - Optical Emission Spectrometry (ICP-OES), Inductively Coupled Plasma - Mass Spectrometry (ICP-MS), Transmission electron microscopy (TEM), High Resolution Transmission electron microscopy (HRTEM), Scanning Electron Microscopy (SEM), High Resolution Scanning Electron Microscopy (HRSEM), Surface Profilometry: Thin Films Thickness measurement, BET Surface Area and Pore Size Analysis, UV-Visible Spectroscopy, Raman Spectroscopy, Fourier transform infrared spectroscopy (FT-IR), Thermal analysis (TG, DTG, DTA and DSC), Dynamic Light Scattering (DLS), and Nuclear Magnetic Resonance (NMR).

### **Fields of Research Interest**

Electroanalytical Chemistry and Electrocatalysis: Photoelectrochemical Cells (Water Splitting), Solar Cells, Electrocatalysis, Ethanol and Methanol Direct Fuel Cells, Cyclic Voltammetry, Potentiometry, Chronoamperometry, Galvanostatic Charge-Discharge, Impedance Spectroscopy, **Nanoporous metal electrodes**, Electrodeposition, Supercapacitors, Oxygen Reduction Reaction (ORR), and Electrochemical Sensing.

Material Science: Nanoporous Materials MOFs and COFs, Nanocomposites, Conducting Polymers, Nanoparticle and Nanostructure Synthesis and Characterization (Special Focus on Metallic and Magnetic nanoparticles).  
Supercritical Fluids Synthesis of Nanoparticles and Digestive Ripening.  
HOMO and LUMO Energy Levels and Band Gap Measurements for Polymeric Materials and Organic Compounds Using Electrochemical Methods.  
Thin Film Preparation Using Electrochemical, Chemical, and Physical Methods.  
Colloidal Crystal Assembly (e.g. Polystyrene and Silica).

Inorganic Chemistry: Inorganic Nanomaterials & Synthesis and Characterization of Coordination Compounds by Spectrometric, Magnetic and Thermal Techniques.

Organic Chemistry: Hyperbranched Polymers (e.g. Polyethylene), Polystyrene Spheres Synthesis and Conducting Polymers Electrosynthesis, Chelating Agents and Coordinating Ligands Synthesis (e.g. Triazole Thiols).

Catalysis and Electrocatalysis: C-C Coupling Reactions (Palladium Complexes, Nanoporous Palladium and Palladium Nanoparticles Impeded in Polymer Matrix and Magnetic Palladium Catalysts), and ORR.

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### Teaching Experiences

1. Teaching Assistant, Chemistry Department, Virginia Commonwealth University, Richmond, VA, USA 2008-2016.
2. Associated Lecture of Chemistry Assiut University, Egypt 2001 to 2008.

### Some of the courses/labs I taught at VCU and Assiut University are:

- Chemz309 Quantitative Chemical Analysis Lab
- Chemz101 General Chemistry Lab and Recitation
- Chemz102 General Chemistry Lab and Recitation
- Instrumental Analysis Lab (e.g. potentiometry, spectrophotometry ...etc) for graduate students.
- Advanced Inorganic Chemistry Lab (complexes preparation and characterization).
- Advanced Physical Chemistry Lab (surface, kinetics, phase rule, ....etc)
- Gravimetric Chemical Analysis Lab
- Advanced Volumetric Chemical Analysis Lab
- General Physical Chemistry Lab

### Publications and Patents

*Patents, some recent published materials, and conferences:*

*Note: In recent patents and publications the first and last names were used while in the older publications the first and middle names were used.*

#### Patents:

1. NON-RARE EARTH MAGNETIC NANOPARTICLES  
United States Patent PCT/US2013/020214, Nov. 07, 2013.  
E. E. Carpenter, Z. J. Huba, K. J. Carroll, **A. Farghaly**, S. N. Khanna, M. Qian and M. Bertino, Non-rare earth magnetic nanoparticles. Google Patents.
2. Invention Disclosure, VCU 2016: THREE-DIMENSIONAL BI-CONTINUOUS NANOPOROUS PLATINUM: A POWERFUL CATALYST AND SENSOR.  
**Ahmed A. Farghaly** and Maryanne M. Collinson

#### Publications:

1. Mesoporous Hybrid Polypyrrole-Silica Nanocomposite Films with a Strata-Like Structure.  
**Ahmed A. Farghaly** and Maryanne M. Collinson. *Langmuir* **2016**, 32 (23), 5925–5936.
2. Micropatterned Flexible and Conformable Biofunctional Devices Using Silk Proteins.  
Ramendra K. Pal, **Ahmed A. Farghaly**, Maryanne M. Collinson, Subhas C. Kundu, Vamsi K. Yadavalli. *MRS Advances* **2016**. DOI: <http://dx.doi.org/10.1557/adv.2016.406>
3. Microdroplet-Based Potentiometric Redox Measurements on Gold Nanoporous Electrodes.  
Christopher J. Freeman, **Ahmed A. Farghaly**, Hajira Choudhary, Amy E. Chavis, Kyle T. Brady, Joseph E. Reiner, and Maryanne M. Collinson. *Analytical Chemistry* **2016**, 88 (7), 3768-3774.

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4. Conducting polymer-silk biocomposites for flexible and biodegradable electrochemical sensors. Ramendra K. Pal, **Ahmed A. Farghaly**, Congzhou Wang, Maryanne M. Collinson, Subhas C. Kundu, Vamsi K. Yadavalli. *Biosensors and Bioelectronics* **2016**, *81*, 294-302.
5. Monoclinic Hydroxyapatite Nanoplates Hybrid Composite with Improved Compressive Strength, and Porosity for Bone Defect Repair: Biomimetic Synthesis and Characterization. Bo Xue,\* **Ahmed A. Farghaly**,\* Zhenzhao Guo, Peng Zhao and Hong Li, Changren Zhou, Lihua Li. *Journal of Nanoscience and Nanotechnology* **2016**, *16* (3), 2254-226.  
**\*Equally Contributed**
6. Potentiometric Measurements in Biofouling Solutions: Comparison of Nanoporous Gold to Planar Gold. **Ahmed A. Farghaly**, Mai Lam, Christopher J. Freeman, Badharinadh Uppalapati and Maryanne M. Collinson. *Journal of The Electrochemical Society* **2016**, *163* (4), H3083-H3087.
7. Photolithographic Micropatterning of Conducting Polymers on Flexible Silk Matrices. Ramendra K. Pal, **Ahmed A. Farghaly**, Maryanne M. Collinson, Subhas C. Kundu, Vamsi K. Yadavalli. *Advanced Materials* **2016**, *28* (7), 1406–1412.
8. Electroassisted Codeposition of Sol–Gel Derived Silica Nanocomposite Directs the Fabrication of Coral-like Nanostructured Porous Gold. **Ahmed A. Farghaly** and Maryanne M. Collinson. *Langmuir* **2014**, *30*, (18), 5276-5286.
9. Magnetic field assisted polyol synthesis of cobalt carbide and cobalt microwires. **Ahmed A. Farghaly**\*, Zachary J. Huba, and Everett E. Carpenter. *Journal of Nanoparticle Research* **2012**, *14* (10) 1-5.
10. Synthesis and characterization of novel polymeric biologically active mixed ligand triazole-3-thiones Complexes. M.A. El-Gahami, S.A. El-Gyar, **A. Abd El-Sameh**\* and S.A. Ibrahim. *Inorganic Chemistry: An Indian Journal* **2009**, *4* (4).
11. Thermal stability, thermokinetic, and decomposition mechanism of copper(II) triazole-3-thiones complexes. S.A. El-Gyar, M.A. El-Gahami, **A. Abd El-Sameh**\* and S.A. Ibrahim. *Inorganic Chemistry: An Indian Journal* **2009**, *4* (3).
12. Synthesis, thermal decomposition, magnetic properties and biological activities of Co(II), Ni(II), Cu(II) and Cd(II) complexes of some triazole-3-thione Schiff bases. S.A. El-Gyar, M.A. El-Gahami, **A. Abd El-Sameh**\* and S.A. Ibrahim. *Polish Journal of Chemistry* **2007** *81* (8) 1387-1402.

### **In preparation:** (Titles are tentative)

13. Three-Dimensional Bi-Continuous Nanoporous Platinum.  
**Ahmed A. Farghaly** and Maryanne M. Collinson.
14. Supercritical Fluids as Novel Digestive Ripening agents Direct the Synthesis of Monodispersed Nanocrystals: One-pot and One-step Process.  
**Ahmed A. Farghaly**, Bo Xue, Maryanne M. Collinson, Ning Zhang, and Xuejun Wen.
15. Metal Nitride nanopillars electrode as potential electrochemical sensors.  
**Ahmed A. Farghaly**, R. K. Khan, Dexian Ye, Maryanne M. Collinson.
16. Synthesis of Pd Aerogels and Their Application in Direct Ethanol Fuel Cells.  
Lamia Nahar, **Ahmed A. Farghaly**, Maryanne M. Collinson, Indika U Arachchige.
17. Synthesis of Pt Aerogels and Their Application in Direct Methanol Fuel Cells.  
Xiaonan Gao, **Ahmed A. Farghaly**, Maryanne M. Collinson, Indika U Arachchige.
18. Sulfur self-doped Nanoporous Carbon Derived from Lignin Biomass for Supercapacitor Applications. Muslum Demir, **Ahmed A. Farghaly**, Maryanne M Collinson and Ram B. Gupta.

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19. Lignin Biomass-derived N-doped Graphitic Carbon Electrode Material for Supercapacitors. Muslum Demir, **Ahmed A. Farghaly**, Emmanuel Nyankson, Burak Aksoy, Timur Islamoglu, Maryanne M Collinson, Hani M. El-Kaderi, and Ram B. Gupta.

## **Selected Conference Presentations**

1. Synthesis of Multifunctional Nanoporous Palladium via a Coelectrodeposition Route. **Ahmed A. Farghaly** and Maryanne M. Collinson. ISCAN October 26-29, 2015.
2. Single-Step Coelectrodeposition of Hybrid Silica Nanocomposite Directs the Fabrication of Free-Standing and Transferal Conducting Polymer Thin Films. **Ahmed A. Farghaly** and Maryanne M. Collinson. ECS 228<sup>th</sup> meeting October 11-15, 2015.
3. When the Impossible Becomes Possible! Free-Standing and Transferable Nanostructured Porous Conducting Polymer Thin Films. **Ahmed A. Farghaly** and Maryanne M. Collinson. 18<sup>th</sup> Annual Graduate Student Research Symposium & Exhibit, April 21, 2015, VCU, Richmond, Virginia, USA.
4. Electrochemistry Drives the Fabrication of Novel Materials: Multicomponent Nanocomposites and Nanostructured Porous Metals. **Ahmed A. Farghaly** and Maryanne M. Collinson. 17<sup>th</sup> Annual Graduate Student Research Symposium & Exhibit, April 22, 2014, VCU, Richmond, Virginia, USA.
5. Magnetic Field Effect on Polyol Synthesis of Cobalt Carbide Nanoparticles. **Ahmed A. Farghaly** and Everett E. Carpenter *International Symposium on Clusters and Nano-Structures (Energy, Environment, and Health)* November 7 - 10, 2011, Richmond, Virginia
6. Synthesis of Silver Nanoparticles Via High Temperature Reduction of Silver(I)-acetylacetonate Complex in Inert Atmosphere. S.A. El-Gyar, M.A. El-Gahami, Mona B. Mohamed, **A. Abd El-Sameh** and S.A. Ibrahim, *The Second Annual Conference for Young Scientists "Basic Science & Technology*, October 18-19, 2008; Assiut, Egypt
7. Thermokinetic, thermal stability and spectral studies of novel copper(II) mixed ligand complexes containing biological active 1,2,4-triazole-3-thiones moieties, S.A. El-Gyar, M.A. El-Gahami, **A. Abd El-Sameh** and S.A. Ibrahim, *2nd International Conference on New Trends in Chemistry and Their Applications*, February 13-15, 2008; Hurghada, Egypt
8. Thermal behaviour and thermokinetic studies of Co(II), Ni(II), Cu(II) and Cd(II) 4-amino-5-benzyl-4H-1,2,4-triazole-3-thione complexes, S.A. El-Gyar, M.A. El-Gahami, **A. Abd El-Sameh** and S.A. Ibrahim, *2nd International Conference on New Trends in Chemistry and Their Applications*, February 13-15, 2008; Hurghada, Egypt
9. Synthesis, Thermal decomposition, Magnetic properties and Spectral Studies of Cu(II), Ni(II), Co(II) and Cd(II) Triazole-3-thiones Complexes With Sulphur and Nitrogen Donor Ligands, S.A. El-Gyar, M.A. El-Gahami, **A. Abd El-Sameh** and S.A. Ibrahim, *The First Annual Conference for Young Scientists "Basic Science & Technology*, May 5-6, 2007; Assiut, Egypt

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10. Reactivity of Cu(II), Ni(II), Co(II) and Cd(II) Triazole-3-thiones Complexes Towards Sulphur and Nitrogen Donor Ligands, S.A. El-Gyar, M.A. El-Gahami, **A. Abd El-Sameh** and S.A. Ibrahim, *10th IBN SINA INTERNATIONAL CONFERENCE on Pure and Applied Heterocyclic Chemistry*, February 17-20, 2007; Luxor, Egypt.
11. Synthesis, thermal decomposition, magnetic properties and biological activities of Co(II), Ni(II), Cu(II) and Cd(II) complexes of some triazole-3-thione Schiff bases. S.A. El-Gyar, M.A. El-Gahami, **A. Abd El-Sameh** and S.A. Ibrahim, *3rd International Conference on Multi-Component Reactions and Related Chemistry*, July 9-13, 2006 Amsterdam, Netherlands.

## **Fellowships and Awards**

- 2016-2014 Electrochemical Society Student Membership Award, nominated by my PhD advisor Prof. Collinson, VCU.
- 2015 Elsevier Outstanding Reviewer Award- European Journal of Medicinal Chemistry
- 2015 Graduate School Scholarship Award, Virginia Commonwealth University, for serving as a member of Graduate Student Association (GSA) Executive Committee and Representative Council.
- 2015 Graduate School Travel Grant Award, Virginia Commonwealth University
- 2014 HR-SEM image for the nanostructured porous gold corals has been chosen to join the VCU image gallery and featured on the VCU homepage in August 2014.
- 2010 Teaching and Research Assistant Scholarship at Virginia Commonwealth University
- 2010 Prof. Raafat Mahmoud Award in Chemistry, Assiut University, Egypt ( Awarded to one out of ~ a hundred graduate students competed for it)
- Ideal/ Role Model Student Award (during undergraduate study)

## **Scientific Journals Reviewer**

Journal of Nanoparticle Research  
European Journal of Medicinal Chemistry  
Journal of Molecular Structure  
Scientific Research Publishing <http://www.scirp.org/>

## **Professional Membership**

Electrochemical Society

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### Interests and Hobbies

1. Reading
2. Helping others
3. Swimming.
4. Ability to re-locate and work in different environment and cultures, solving problems, career-oriented, dynamic, ambitious, self-confidence, potential to work in group and under pressure.
5. Able to learn fast and collaborate with the others.

### Reference Professors

1. Dr. Maryanne M. Collinson. (Ph.D. Dissertation Advisor)  
Professor of Chemistry & Director of Graduate Recruitment  
1001 West Main Street, Department of Chemistry, Virginia Commonwealth University,  
Richmond VA, 23284.  
Email: [mmcollinson@vcu.edu](mailto:mmcollinson@vcu.edu)  
Phone: +1(804) 828-7509
2. Dr. Ram B. Gupta (I closely worked with him on an energy project).  
Associate Dean for Research, School of Engineering  
Professor, Department of Chemical and Life Science Engineering  
Virginia Commonwealth University  
601 West Main Street, Suite 331, Richmond, VA 23284-3068  
Email: [rbgupta@vcu.edu](mailto:rbgupta@vcu.edu)  
Phone: +1(804) 828-1211
3. Dr. Indika U. Arachchige (PhD Committee Member)  
Assistant Professor of Inorganic and Materials Chemistry  
1001 West Main Street, Department of Chemistry, Virginia Commonwealth University,  
Richmond VA, 23284.  
Email: [iuarachchige@vcu.edu](mailto:iuarachchige@vcu.edu)  
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4. Dr. Joseph Topich  
Associate Professor of Inorganic Chemistry  
1001 West Main Street, Department of Chemistry, Virginia Commonwealth University,  
Richmond VA, 23284.  
Email: [jtopich@vcu.edu](mailto:jtopich@vcu.edu)  
Phone: +1 (804) 828-4358
5. Dr. Said A. Ibrahim (M.Sc. Thesis Advisor)  
Professor of Inorganic Chemistry, Chemistry Department, Assiut University, Egypt.  
Former Vice-President for Education & Students' Affairs, Assiut University, Egypt.  
Email: [saidib@aun.edu.eg](mailto:saidib@aun.edu.eg) or [saidibrahim7@yahoo.com](mailto:saidibrahim7@yahoo.com)  
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