Gayan Adikari Appuhamillage

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EDUCATION

Ph.D., Chemistry, The University of Texas at Dallas, Richardson, TX **2018**
Thesis title: *New 3D Printable Polymeric Materials for Fused Filament Fabrication (FFF).*
Advisor: Prof. Ronald A. Smaldone

M.S., Chemistry, Sam Houston State University, Huntsville, TX **2013**
Thesis title: *Resistance of Escherichia coli towards toxic metalloidal oxyanions and study of gshA, gshB genes in their glutathione biosynthetic pathway, and an effort to produce an Escherichia coli strain with a higher glutathione content.*
Advisor: Prof. Thomas G. Chasteen

B.S., Chemistry, University of Kelaniya, Kelaniya, Sri Lanka **2009**
Thesis title: *Study of heavy metal adsorption capacities of clays and development of recovery methods to effectively remove and to convert the adsorbed metals into reusable forms.*
Advisor: Dr. Russel C. L. de Silva

RESEARCH EXPERIENCE

Postdoctoral Research, Virginia Tech, Blacksburg, VA **2018 -present**
Mentor: Prof. Timothy E. Long
Synthesis and characterization of high performance engineering polyimides for 3D printing using direct-ink-write (DIW) and stereolithography (SLA).
Synthesis and characterization of novel, 3D printable polyimides as electrolyte matrices for Li ion battery applications.
Mentoring a visiting Ph.D. candidate from Tunisia on glycerol based hydrogels for cytotoxicity studies and 3D printable isosorbide polymer synthesis based on thiol-ene Chemistry.

Graduate Research, The University of Texas at Dallas, Richardson, TX **2013-2018**
Advisor: Prof. Ronald. A. Smaldone
Synthesis and characterization of novel polymeric materials based on furan-maleimide Diels-Alder chemistry for FFF 3D printing.
Preparation, thermo-mechanical characterization, and extrusion of thermoplastic polymer blends *via* reversible Diels-Alder chemistry to achieve enhanced mechanical properties upon 3D printing.

Development of 3D printable Diels-Alder reversible thermoset polymer blends and post-curing studies to achieve isotropic mechanical properties.
Synthesis, characterization, and 3D printing (DIW and SLA) of hydrogels based on chitosan as a biopolymer for toxic heavy metal adsorption in waste-water systems and as potential materials for cell-growth applications.
Supervision of laboratory work of less experienced graduate students and undergraduates.
Laboratory chemical waste management ensuring compliances with environmental health and safety.

Graduate Research, Sam Houston State University, Huntsville, TX 2011-2013

Advisor: Prof. Thomas G. Chasteen

Study of the reducing power of selected *E. coli* strains for toxic oxyanions SeO_3^{2-}, SeO_4^{2-}, and TeO_3^{2-}, against a wild type *E. coli* in terms of their relative ability to produce intracellular glutathione (GSH).
Modification of an *E. coli* strain with a better reducing power for bioremediation of toxic oxyanions *via* gene engineering.

Undergraduate Research, University of Kelaniya, Kelaniya, Sri Lanka 2005-2009

Advisor: Dr. Russel C. L. de Silva

Study of heavy metal (Pb, Cd, and Cr) adsorption capacities of selected environmental clay types with varying pH, temperature, contact time, and interfering cationic species.
Applying ion-exchange techniques to remove adsorbed metals from clay surfaces.
Carrying out electrodeposition techniques for the recovery of heavy metals.

PATENTS AND RESEARCH PUBLICATIONS

Patents:

Appuhamillage, Gayan A.; Berry, Danielle R.; Benjamin, Candace E.; Luzuriaga, Michael A.; Reagan, John C.; Gassensmith, Jeremiah J.; Smaldone, Ronald A. 3D Printed Chitosan/Pluronic Hydrogels for Toxic Heavy Metal Adsorption, **US Patent Application Tech ID 18028; Serial No. 62/642,935; February 2018.** Patent pending.

Peer-Reviewed Journal Articles:

1. Dharmarwardana, M.; Arimilli, Bhargav S.; Luzuriaga, Michael A.; Kwon, S.; Lee, H.; **Appuhamillage, Gayan A.**; McCandless, Gregory T.; Smaldone, Ronald A.; Gassensmith, Jeremiah J. The Thermo-Responsive Behavior in Molecular Crystals of Naphthalene Diimides and their 3D Printed Thermochromic Composites, *Cryst. Eng. Comm.* **2018**, *20*, 6054.
2. **Appuhamillage, Gayan A.**; Reagan, John C.; Khorsandi, Sina; Davidson, Joshua R.; Voit, Walter; Smaldone, Ronald A. 3D Printed Remendable Polylactic Acid Blends with Uniform Mechanical Strength Enabled by a Dynamic Diels-Alder Reaction, *Polym. Chem.* **2017**, *8*, 2087.
3. Davidson, Joshua R.; **Appuhamillage, Gayan A.**; Thompson, Christina M.; Voit, Walter; Smaldone, Ronald A. Design Paradigm Utilizing Reversible Diels-Alder Reactions to Enhance

the Mechanical Properties of 3D Printed Materials, *ACS Appl. Mater. Inter.* **2016**, *8*, 16961. **(co-first author)**

4. Diaz-Vasquez, Waldo A.; Abarca-Lagunas, Maria J.; Arenas, Felipe A.; Pinto, Camilo A.; Cornejo, Fabian A.; Wansapura, Poorna T.; **Appuhamillage, Gayan A.**; Chasteen, Thomas G.; Vasquez, Claudio C. Tellurite Reduction by *Escherichia coli* NDH-II Dehydrogenase Results in Superoxide Production in Membranes of Toxicant-Exposed Cells, *BioMetals* **2014**, *27*, 237.
5. **Appuhamillage, Gayan A.**; De-Silva, Russel C. L. Study of Heavy Metal Adsorption Capacities of Clays and Development of Recovery Methods to Effectively Remove and to Convert the Adsorbed Metals into Reusable Forms, *Proc. Sri Lanka Assoc. Adv. Sci.* **2009**, *65*, 137.

Manuscripts Under Review:

1. **Appuhamillage, Gayan A.**; Berry, Danielle R.; Benjamin, Candace E.; Luzuriaga, Michael A.; Reagan, John C.; Gassensmith, Jeremiah J.; Smaldone, Ronald A. A Biopolymer-Based 3D Printable Hydrogel for Toxic Metal Adsorption from Water, *Polym Int.* **2018** (under review).

HONORS, AWARDS, AND ACHIEVEMENTS

Graduate Teaching Certificate **2018**
The University of Texas at Dallas
Ph.D. Research Travel Grant Award **2017**
Department of Chemistry, The University of Texas at Dallas
Ph.D. Research Travel Grant Award **2016**
Department of Chemistry, The University of Texas at Dallas
Graduate Research Exchange Program- Presentation Award **2013**
Graduate Studies and College of Education, Sam Houston State University
Special Graduate Scholarship Award **2012/2013**
College of Sciences, Sam Houston State University
Graduate Student Fellowship **2012/2013**
Department of Chemistry, Sam Houston State University

CONFERENCE PRESENTATIONS

1. "Towards Optimization of Final Part-Quality of All-Aromatic Polyimides Using UV-Assisted Direct-Ink-Write"-Poster, Polycondensation Meeting **2018**, Alexandra, VA.
2. "Printing Aromatic Polyimides Using Light"-Oral, Polymer Additive Manufacturing Consortium All-Hands Meeting **2018**, Virginia Polytechnic Institute and State University, Blacksburg, VA.
3. "Chitosan-pluronic diacrylate hydrogels as 3D printable material for heavy metal ion adsorption"-Oral, 255th American Chemical Society (ACS) National Meeting **2018**, New Orleans, LA.

4. "Perylene-polyether block polyimides as redox active electrode materials for high performing lithium-organic batteries"-Oral, 73rd Southwest American Chemical Society Conference **2017**, Lubbock, TX.
5. "Chitosan-Pluronic Diacrylate Hydrogels as 3D Printable Material for Heavy Metal Ion Adsorption and Potential Candidates for Cell Growth Applications"- Poster, Polymer Additive Manufacturing Consortium All-Hands Meeting **2017**, The University of Texas at Dallas, TX.
6. "3D Printable Diels-Alder Polymers as Potential Candidates for Electrical Insulating Materials"- Oral, 50th Annual Meeting-in-Miniature, American Chemical Society Conference **2017**, Fort Worth, TX.
7. "Self-Healing Design Paradigm Utilizing Reversible Diels-alder Reactions to Enhance Mechanical Properties of 3D Printed Materials"-Poster, 252nd ACS National Meeting **2016**, Philadelphia, PA.
8. "Design Paradigm and Post Curing Studies Utilizing Reversible Diels-Alder Reactions to Enhance Mechanical Properties of 3D Printed Materials"-Oral, 72nd Southwest American Chemical Society Conference **2016**, Galveston, TX.
9. "Polyimide-Polyether Block Copolymers as Adhesives and Potential Candidates for Electrochromic Devices"-Oral. 49th Annual Meeting-in-Miniature, American Chemical Society Conference **2016**, Denton, TX.
10. "3D Printable Polymer Blends *via* Diels-Alder Dynamic Covalent Chemistry"-Oral, 5th Texas Soft Matter Conference **2016**, The University of Texas at Dallas, TX.
11. "Bioremediation of Toxic Oxyanions Using Genetically Modified *Escherichia coli* Strains and Study of Their Glutathione Biosynthetic Pathway"-Oral, Graduate Research Exchange Conference **2013**, Sam Houston State University, Huntsville, TX.

TEACHING AND MENTORING EXPERIENCE

Graduate Teaching Assistant, The University of Texas at Dallas, TX **2013-2016**
Organic chemistry I and II.

Graduate Teaching Assistant, Sam Houston State University, TX **2011-2013**
Instrumental analytical chemistry, quantitative analytical chemistry, inorganic chemistry, and general chemistry (laboratory and tutoring).

Teaching Assistant, University of Kelaniya, Sri Lanka **2009-2011**
Organic chemistry, inorganic chemistry, analytical chemistry, and physical chemistry.

TECHNICAL PROFICIENCY

Chemical Methods:
Organic monomer and polymer synthesis, purification techniques, characterization methods.

Instrumental Methods:
Fused filament fabrication (FFF) 3D printing, Stereolithography (SLA) 3D printing, Direct-Ink-Write (DIW) 3D printing, polymer photo-rheology, polymer viscosity (solution, melt),

filament/paste extrusion, tensile testing (extension mode, compression mode), Differential Scanning Calorimetry (DSC), Thermogravimetric Analysis (TGA), Dynamic Mechanical Analysis (DMA), Dynamic Light Scattering (DLS), Scanning Electron Microscopy (SEM), Gel Permeation Chromatography (GPC), flash column chromatography, ion exchange chromatography, NMR spectroscopy, FT-IR spectroscopy, UV-Vis spectroscopy, Inductively Coupled Plasma/Mass Spectroscopy (ICP/MS), Gas Chromatography/Mass Spectrometry (GC/MS), Flame Atomic Absorption Spectroscopy (Flame AAS), fluorescence spectroscopy, oxygen plasma asher operation, Polymerase Chain Reaction (PCR) gene sequencing, gel electrophoresis, electrodeposition techniques.

Computer/IT:

Computer-aided Design-(CAD) software (Autodesk, SolidWorks, Blender 3D modeling)
Analytical software (Origin)
Molecular modeling software (Avogadro)
Microsoft Office suite (Word, Excel, PowerPoint, Access, Outlook)
ChemOffice suite (ChemDraw)

PROFESSIONAL AFFILIATIONS/MEMBERSHIPS

American Chemical Society **2014-present**

REFERENCES

Prof. Timothy E. Long	Prof. Ronald A. Smaldone	Prof. Walter E. Voit
Professor	Associate Professor	Associate Professor
Virginia Tech, VA	The University of Texas at Dallas, TX	The University of Texas at Dallas, TX
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