Natural Sciences and Engineering Research Council of Canada | Conseil de recherches en sciences naturelles et en génie du Canada

FORM 200
Application for an IPS, IRDF or VF
COVER PAGE

AID	
CTTEE	
Date	2016/06/18

Type of Award	Reference No.
VFG	386145724

Family name of applicant	Given name	Initial(s) of all given names	Personal identification no. (PIN)
Olatinwo	Mutairu Bolaji	MBO	500753

ADDRESSES. Changes to any of the information below must be sent to schol@nserc-crsng.gc.ca.

Current address	Permanent address (if different from current mailing address)
375 West Roosevelt St., Apartment 3226 Baton Rouge, LA UNITED STATES 70802	Sw9/800 B Apata Ganga, Ibadan, Oyo State Nigeria NIGERIA

If current address is temporary, indicate leaving date	Telephone number at permanent address
	234 (70) 30123416

Telephone number	Facsimile number	E-mail address (NSERC will use this information as the initial point of contact.)
(225) 2762385		molati1@lsu.edu

CITIZENSHIP

[ ] Canadian citizen	[ ] Permanent resident of Canada	[X] Other

Indicate date of landing as stated on official immigration document	Indicate country of citizenship
	Nigeria

LANGUAGE OF CORRESPONDENCE

I wish to receive my correspondence in:

[X] English [ ] French

SIGNATURE (Refer to the instructions under the heading "What does my signature on the application mean?")

I hereby agree that any award made to me as a result of this application will be subject to the general conditions governing scholarships and fellowships. These conditions are outlined in this Web site in the NSERC *Program Guide for Students and Fellows,* and *Visiting Fellowships in Canadian Government Laboratories* guide.

Applicant's signature

Personal information collected on this form and appendices will be stored in the Personal Information Bank for the appropriate program.

Natural Sciences and Engineering Research Council of Canada | Conseil de recherches en sciences naturelles et en génie du Canada

FORM 200
Application for an IPS, IRDF or VF

Type of Award	AID	CTTEE	Date
VFG			2016/06/18

Family name of applicant	Given name	Initial(s) of all given names	Personal identification no. (PIN)
Olatinwo	Mutairu Bolaji	MBO	500753

ACADEMIC BACKGROUND (include only current and past degree programs)

Degree	Name of discipline	Department, institution and country	Month and year started	Month and year awarded/expected
Bachelor's	Industrial Chemistry, BSc	Chemistry University of Ibadan, NIGERIA	6 / 2003	4 / 2007
Master's	Organic Chemistry, MSc	Chemistry University of Ibadan, NIGERIA	8 / 2008	Transferred to Ph.D.
Doctorate	Inorganic Chemistry-Materials Science	Chemistry Louisiana State University, UNITED STATES	8 / 2011	8 / 2016

Natural Sciences and Engineering Research Council of Canada | Conseil de recherches en sciences naturelles et en génie du Canada

FORM 200
Application for an IPS, IRDF or VF

Type of Award	AID	CTTEE	Date
VFG			2016/06/18

Family name of applicant	Given name	Initial(s) of all given names	Personal identification no. (PIN)
Olatinwo	Mutairu Bolaji	MBO	500753

ACADEMIC, RESEARCH AND OTHER RELEVANT WORK EXPERIENCE

Position held and nature of work (begin with current) Full Time - Part Time	Organization and department	Supervisor	Period (mm/yyyy-mm/yyyy)
Teaching Assistant - Full Time Teaching of general chemistry laboratories	Louisiana State University Chemistry	Dr. Linda Allen	8/2014 - 5/2016
Research Assistant - Full Time Working on analysis of various formulations of flame retardants using X-ray imaging techniques and m	Louisiana State University Chemistry	Prof. Leslie G. Butler	1/2012 - 6/2016
Solution Assistant - Full Time Working in the organic lab to prepare solutions for the advanced organic chemistry labs	Louisiana State University Chemistry	Dr.Tamara Nauman	8/2011 - 12/2011
Lecturer II Teaching of organic and inorganic chemistry classes and labs	Kwararafa University Chemistry	Dr. Raphael Odoh	2/2010 - 7/2011
Intern student - Full Time Preparation of solutions for the laboratory experiments.	Lagos University Teaching Hospital, LUTH, Lagos, Nigeria Pharmaceutical Department	Mr. Abideen Osibanjo	5/2005 - 8/2005

Personal identification no. (PIN)	Family name, given name and initial(s) of applicant
500753	Olatinwo, Mutairu Bolaji MBO

AWARD APPLIED FOR

Type of award	Proposed starting date of award
Visiting Fellowships in Canadian Government Laboratories	2017/01

Proposed degree program (e.g. Bachelors, Masters, Doctorate)	Proposed field of study/research	Research subject code
	POLYMER CHEMISTRY	3750

Title of proposed research

New generation flame retardant, alloy, renewable energy and materials studies using X-ray imaging method coupled with UL 94 test, FTIR, XANES, GCMS, ICPMS, EGA, SEM-EDS and spectrophotometry.

List ten (10) key words that describe your proposed research. Use commas to separate them.

Flame retardants, X-ray K-edge absorption, Tomography, Interferometry, Radiography, UL 94 burn test, Visualization, FEI Avizo, Char layer, Gas bubbles

PROPOSED LOCATION(S) OF TENURE (in order of preference)

Institution/organization	Department	Program of study	Proposed supervisor
Natural Resources Canada,	Advanced Combustion Technology		
Atmospheric Environment Service,	Canadian Light Source		
National Water Research Institute,	Saskatoon		

Are any of your proposed programs of study:

Clinically-oriented? [X] Yes [ ] No Joint programs with a professional degree (e.g., MD/PhD)? [X] Yes [ ] No

SECTION TO BE COMPLETED BY IPS APPLICANTS ONLY

Indicate the total number of months of graduate studies (master's and doctoral) you have completed as of December 31 of the year of application in the natural sciences and engineering.

_____ months of full-time studies _____ months of part-time studies

Indicate the number of months of studies you have completed, as of December 31 of the year of application, **in the program for which you are requesting funding.**

_____ months of full-time studies _____ months of part-time studies

Indicate if you are attending university at the time of application.

Attending full time [ ] Attending part time [ ] Not attending

Natural Sciences and Engineering Research Council of Canada | Conseil de recherches en sciences naturelles et en génie du Canada

FORM 200
Application for an
IPS, IRDF or VF

Type of Award	Personal Identification no. (PIN)	Family name, given name and initial(s) of applicant
VFG	500753	Olatinwo, Mutairu Bolaji MBO

SCHOLARSHIPS AND OTHER AWARDS OFFERED (start with most recent and include NSERC awards)

Name of Award	Value $CAD	Level (Institutional, Provincial, National, International)	Type (Academic, Research, Leadership, Communication)	Location of tenure	Period held (yyyy/mm - yyyy/mm)
Student Travel Award, LSU	1,200	Institutional	Academic	LSU Graduate Dean's Award	
Muzaffar Zafr Educational Scholarsh	1,300	Institutional	Academic	LSU	
Student Travel Award, LSU	650	National	Academic	Argonne National Lab	
A. G. Leventis Foundation	15,450	International	Research	LSU	
Alpha Kappa Alpha Educational	1,676	National	Academic	Louisiana State University	
Oyo State Scholarship Award	1,295	Provincial	Academic	University of Ibadan, Nigeria	2010/04 - 2009/11

Type of Award	Personal identification no.(PIN)	Family name, given name and initial(s) of applicant
VFG	500753	Olatinwo, Mutairu Bolaji MBO

THESIS COMPLETED OR IN PROGRESS

1. Degree	Supervisor	Date degree requirements completed
PhD	Prof. Leslie G. Butler	05/2016

Title of thesis
USE OF X-RAY K-EDGE TOMOGRAPHY AND INTERFEROMETRY IMAGING TECHNIQUES FOR THE STUDIES OF BROMINATED FLAME RETARDANTS

2. Degree	Supervisor	Date degree requirements completed
MSc	Dr. Ganiyat K. Oloyede	05/2010

Title of thesis
CHEMICAL CONSTITUENTS AND BIOLOGICAL ACTIVITIES OF LEAVES AND BARK-STEMS OF SANDBOX TREE, HURA CREPITANS

SUMMARY OF THESIS MOST RECENTLY COMPLETED OR IN PROGRESS

Use plain language. Do not reproduce abstract of thesis.

The work presented in the dissertation is based on the studies of flame retardancy performance of various formulations consisting of brominated flame retardants (BFRs: Saytex 8010 and Green Armor) and their synergist, antimony trioxide (Sb2O3) in high impact polystyrene (HIPS). Chemical flame retardants are incorporated in polymers to improve their flame inhibition for optimal applications in electrical and electronic devices, furniture, printers and more. These flame retardant polymer blends are studied using the Underwriters Laboratory vertical burn test (UL 94) and X-ray imaging techniques such as X-ray K-edge absorption tomography and X-ray grating interferometry.

The UL 94 burn test is initially performed to assess the flammability behavior of flame retardant samples before X-ray imaging methods of burnt and pristine polymer blends. Because the UL 94 test bars are formulated with varying concentrations of a brominated flame retardant (Saytex 8010® or Green Armor®) and a synergist, Sb2O3 into a high impact polystyrene (HIPS), samples pass or fail the UL 94 plastics flammability test based on the burn time and other factors. Then, the X-ray imaging techniques are used to reveal internal features for the flame retardant performance during the burn.

The Underwriters Laboratory 94 test bars are imaged with X-ray K-edge absorption tomography between 12 to 32 keV to assess the bromine and antimony concentration gradient across char layers of partially burnt samples. X-ray grating interferometry on partially burnt samples shows gas bubbles and dark-field scattering ascribed to residual blend inhomogeneity. In addition, X-ray single-shot grating interferometry is used to record X-ray movies of test samples during heating intended to mimic the UL 94 plastics flammability test. Key features such as char layer, gas bubble formation, micro-cracks, and dissolution of the flame retardant in the char layer regions are used in understanding the efficiency of the flame retardant and synergist. The samples that pass the UL 94 test have a thick, highly visible char layer, low bromine and antimony concentration in the char layer as well as an interior rich in gas bubbles. Growth of gas bubbles from flame retardant thermal decomposition is noted in the X-ray phase contrast movies. Also noteworthy is an absence of gas bubbles near the burning surface of the polymer; dark-field images after burning suggest a micro-crack structure between interior bubbles and the surface. The accepted mechanism for flame retardant activity includes free radical quenching in the flame by bromine and antimony species.

Type of Award	Personal identification no.(PIN)	Family name, given name and initial(s) of applicant
VFG	500753	Olatinwo, Mutairu Bolaji MBO

JUSTIFICATION FOR LOCATION OF TENURE

Provide a rationale for your choice(s) for location of tenure (maximum 1 page). See instructions for further details.

My first choice of Natural Resources Canada, Advanced Combustion Technology is based on the fact that I think I can contribute for the wise use of resources, reducing costs of materials while still attaining optimal performance, protecting the environment by creating safe materials, and creating new products and services.

Based on the Natural Resources Canada Resource Center, I am interested in conducting excellent research in science and technology to better human experience in developing more efficient and safe materials for use. This is one economical approach of protecting our environment. The CanmetMATERIALS-Hamilton and Calgary for research in metals, materials for use in automotive applications, clean energy, pipelines, eco-materials is doing excellent work, and I think my chemistry knowledge will be useful in research and development to study a variety of materials. Other areas of interest are found in the Bitumen Production Program, Mining and Mineral Sciences Laboratory and CANMET Energy Technology Centre (CETC)-Ottawa for research in mineral processing, waste disposal, characterization, renewable energy, CO2 management, and transportation systems.

Research into design and development of new generation flame-retardants is essentially important as some brominated flame-retardants are phased out due to environmental issues. More studies are needed for the development of efficient and safe flame-retardants because of their wide range of applications in electronic devices, transportation, furniture, wire and cable and more. Synergism between flame-retardants can help to attain optimal flame retardancy in materials if flame-retardants are used in correct proportion. During combustion and flame propagation of materials without flame-retardants, it leads to production of tons of carbon dioxide, CO2 causing global warming or climate change. In the presence of flame-retardants, the CO2 generation is optimally reduced. Using safe flame-retardants, for instance, mineral flame-retardants, such as magnesium hydroxide, Mg(OH)2 and aluminum hydroxide, Al(OH)3, it leads to formation of harmless products, but it is not economical due to high loadings/wt% needed to attain optimal flame retardancy performance. In addition, at elevated temperature, their efficiency is drastically reduced. With the recent experience of analysis of brominated flame retardants using X-ray imaging, Underwriters Laboratory burn test, Scanning electron microscope with energy dispersive X-ray spectroscopy, Infra-red and Raman and more, design and applications of new materials will be explored to better research and development in Natural Resources Canada.

Research interests:
-Development of advanced materials, processes and fabrication techniques for the next generation vehicles, including incorporation of flame-retardants.
-Development of hybrid materials, new materials recycling technologies.
-Development of nanotechnology-based titanium dioxide photo-catalyst materials and highly corrosion-resistant materials.
-Development of safe and efficient flame retardants to reduce air emissions during material combustion process.
-Analysis and quantification of air emissions and flame effluents of materials with harmful effects on environment using spectrophotometry, gas chromatography mass spectrometry, Fourier transform infra-red, non-dispersive infra-red, evolved gas analysis. Detection and identifica