# Curriculum Vitae

## Vittorio (Victor) Luca, Ph.D.

**Most Recent Positions**

Whakatāne District Councilor 2019-2022
Whakatāne District Mayor 2022-2025

Senior Research Scientist & Research Leader
Comisión Nacional de Energía Atómica
Av. General Paz 1499
San Martin 1650
Buenos Aires
http://www.cnea.gov.ar

Associate Professor
Universidad Nacional de San Martín
Buenos Aires
Argentina
http://www.unsam.edu.ar/

**Current Address:** 76 McGarvey Road,
Whakatāne, New Zealand
Mobile: +64 27 749 88 88
e-mail: victorlucanz@gmail.com

### Personal Details

| | |
|---|---|
| **Place of Birth:** | Whakatāne, New Zealand |
| **Citizenships:** | New Zealand (LK 658997), Australia (M9129403), Italy & Argentina |
| **Marital Status:** | Married with two children |
| **Languages Spoken:** | English, Italian & Spanish. |

**Goal:** Contribute to the sustainability, health and prosperity of the environment, industry and people of New Zealand line with the UN Sustainable Development Goals.

### Education History

| | | |
|---|---|---|
| **1984 – 1988** | Ph.D. in Chemistry<br>Thesis Title: *Spectroscopic Study of Cation Migration in Smectite Clay Minerals* | Victoria University of Wellington, New Zealand |
| **1983 - 1984** | B.Sc. (hons) in Chemistry & Geochemistry<br>Project Title: *Intercalation of Inorganic Props in Montmorillonite* | Victoria University of Wellington, New Zealand |
| **1980 - 1982** | B.Sc. in Chemistry | Victoria University of Wellington, New Zealand |

### Employment History and Work Experience

**2019 – Present** **District Councilor** **Whakatāne District Council**

**Competencies & Achievements**

- Climate change science
- Understanding of district infrastructure
- Strategic and financial planning
- Risk management
- Development of annual & long-term plans & policies
- Community engagement and education

- Oversight of council operations
- Evaluation of council and CEO performance

| **2009 – 2019** | **Senior Research Scientist, Research Leader & Facility Manager** | **Comisión Nacional de Energía Atómica** |
|---|---|---|

**Responsibilities**

- Development of research program relevant to the back-end of the nuclear fuel cycle as part of the National Radioactive Waste Management Program.

  Research projects:

  1) Pyrolysis of radioactive spent polymeric ion exchange resins to form mechanically and chemically stable (leach resistant) pyropolymers and carbons.
  2) Development of advanced solid extractants for the separation and subsequent immobilization of radioisotopes including carbons, coordination polymer, functionalized and non-functionalized open-framework metal oxides and biomass and carbons applicable to radioactive waste liquids, environmental decontamination and rare-earth element separations;
  3) Development of solid adsorbents for the capture and sequestration of radioactive gases ($^{14}CO_2$ , $^{129}I_2$ …).
  4) Development of clean processes for the production of the important medical radioisotope, $^{99}Mo$, that is used in medical diagnostics (SPECT imaging).
  5) Detection and quantification of natural and anthropogenic isotopes in environmental solutions and radioactive radioactive waste liquids and gases.
  6) Radiation stability of nanostructured ceramics.

- Establishment of research team involving staff recruitment, training and mentoring.
- Acquisition and commissioning of about $3M USD of new instrumentation.
- Design, development and licencing of Class 2 radiochemical facility and associated infrastructure.
- Development of radiation and chemical safety protocols and QA procedures.
- Undergraduate and graduate teaching as Associate Professor at University of Saint Martin. Courses taught:
  - Radioactive waste management and fuel cycle chemistry
  - Production of radioisotopes for nuclear medicine
- Early career researcher training. Currently supervising three Ph.D. students.

| | |
|---|---|
| **Competencies & Achievements** | - Expertise in the use of a wide range of instrumental techniques for determining structure, microstructure and properties of a wide range of materials.<br>- Radiochemical speciation and transport of metal ions in the environment.<br>- Extractive hydrometallurgy.<br>- Pyrolysis and thermal transformation of polymeric materials (spent radioactive IX resins).<br>- Radiopharmaceutical production and utilization in nuclear medicine.<br>- All facets of radioactive waste management.<br>- Synthesis of wide range of conventional materials including microporous network and layered silicates, cementitious materials, glasses, ceramics and refractory ceramics and advanced nanostructured materials for the capture and/or sequestration of radioactive and nonradioactive elements from the aqueous and gas phase, as transmutation targets.<br>- Development of refractory ceramics as nuclear target materials.<br>- Interaction of radiation with matter & radiation response of advanced materials.<br>- People, financial, administrative and scientific management of research projects & facilities. |

| | | |
|---|---|---|
| **1997 - 2009** | **Principal Research Scientist & Research Leader** | **Australian Nuclear Science and Technology Organization** |

| | |
|---|---|
| **Responsibilities** | - Provision of scientific leadership by conceiving innovative research ideas, performing experimental research, writing research papers and management reports, setting of scientific and strategic directions, supervision and mentoring of a multidisciplinary research, annual internal and external project reviews.<br>- Projects leadership of fully funded ANSTO projects:<br>(i) 2008-2009: Separation Science (10 staff)<br>(ii) 2004-2007: Advanced Materials for Environment and Energy Applications (12 staff)<br>(iii) 2002-2004: Mesoporous and Nanostructured Materials (3 staff)<br>(iv) 2002-2004: Selective Inorganic Sorbents (4 staff)<br>- Staff mentoring and performance evaluations, management of quality systems, and financial management of project resources.<br>- Writing of business cases for financing infrastructure needs.<br>- Development of new research initiatives in nuclear separations science, pyroelectrochemistry, and development of novel nanoporous metal oxide and hybrid adsorbents through molecular self-assembly.<br>- PhD Student co-supervision.<br>- Scientific and financial management of four fully funded ANSTO projects over a period of close to 10 years.<br>- Initiation of, and participation in, numerous strategic national and international collaborations and alliances including EuroPart, CNEA (Argentina), Czech Technical University (radiochemistry group), NECSA (S. Africa), National Hydrogen Materials Alliance, University New South Wales, Ian Wark Research Institute, University of Melbourne.<br>- Contribution to the career development of ANSTO personnel. |
| **Competencies & Achievements** | - Knowledge in all areas of radioactive waste management.<br>- Ability to sell ideas and present them in such a way as to obtain buy in from funding agencies. |

- Development of functional porous metal oxide ion exchange materials and processes for the separation of radioactive and non-radioactive heavy metals applicable to the advanced nuclear fuel cycle, medical isotope production, minerals processing and water treatment.
- Expertise in separation science, materials chemistry, conventional and advanced nuclear fuel cycles, aqueous chemistry of metal ions including actinides (hydrometallurgy) & leaching/dissolution of ceramics/minerals.
- Competency/expertise (demonstrable) in a very wide range of materials characterization techniques including X-ray and Neutron Scattering techniques such as Diffraction, Reflectivity, Small-Angle Scattering and spectroscopies such as X-ray Absorption Spectroscopy (synchrotron), FTIR-Raman, Solid-State Nuclear Magnetic Resonance, Electron Spin Resonance, Electron Microscopy, particle size and porosity determination and Mössbauer spectrosocpy. Have also developed proficiency in microscopy techniques such as SEM and TEM and have an understanding of electrochemistry and radiochemistry.
- Rietveld analysis of crystalline materials.
- Competency/expertise in a variety of chemical laboratory methods including inorganic chemistry procedures, coordination chemistry, intercalation chemistry, sol-gel chemistry, Schlenk techniques, and high temperature processes such as hot isostatic pressing.
- Development of novel energy and environmental materials e.g. lithium-ion batteries, semiconductor materials for water splitting.
- Highly developed scientific leadership skills.
- Research project leader and facilitator of high quality scientific outputs and practical outcomes in the nuclear separations and energy materials fields.
- Coordinator and facilitator of ANSTO involvement in international projects.
- Referee for X-ray absorption spectroscopy beam time proposals at Australian synchrotron beamlines.

| **1995 – 1997** | **Senior Research Fellow** | **Department of Physical Chemistry, University of New South Wales, Sydney.** |
|---|---|---|
| **Responsibilities** | - Synthesis and photochemistry of semi-conducting titanium dioxide in the form of xerogels and thin films.<br>- Soft-chemical preparations of a range of metal oxides.<br>- Preparation of new nanostructured metal oxides using molecular self-assembly.<br>- Non-official supervision and mentoring of PhD Students.<br>- Lecturing in chemical equilibrium (1st year) and molecular spectroscopy (honours level). | |
| **Competencies & Achievements** | - Detailed knowledge of the theory and application of laboratory and synchrotron-based X-scattering techniques including X-ray Absorption Spectropscopy, Glancing Angle X-ray Diffraction and X-ray Reflectivity.<br>- Theory and Solid State Nuclear Magnetic Resonance and spectrometer operation.<br>- Theory and application Electron Spin Resonance techniques.<br>- Detailed understanding of Li-insertion in $TiO_2$ revealed through application of above-mentioned techniques.<br>- Mechanism of vanadium oxide mesophase formation in non-aqueous media. | |

| **1991-1994** | **Post Doctoral Fellow** | **Research School of Chemistry, The Australian National University, Canberra.** |
|---|---|---|

| | |
|---|---|
| **Responsibilities** | - Computer interfacing of CW- and Pulsed-ESR and spectrometer.<br>- CW- and Pulsed ESR studies of paramagnetic transition metal ion doped porous metal oxides and interaction of organic adsorbates with mineral sufraces.<br>- Synthesis of metal ion substituted smectites, nano-tubular silicates<br>- Synthesis and properties of novel mesostructured vanadates, aluminosilicates, titanium silicates materials via sol-gel and supra-molecular templating strategies.<br>- Synthesis and study of the properties of vanadium bronzes.<br>- Running of physical and theoretical chemistry department seminar program. |
| **Competencies & Achievements** | - Fluent computer programming in the C language.<br>- Development of software for simulation of ESR spectra.<br>- First ever synthesis of new surfactant-templated vanadium and other metal oxides.<br>- Development of novel layered transition metal silicate catalysts (Zn, Ti-substituted smectites).<br>- Understanding of the structural and surface chemistry of fine-grained aluminosilicates and other high surface area oxide materials. |

| **1989-1991** | **Post Doctoral Research Associate** | **Department of Chemistry, University of Houston, Houston, Texas.** |
|---|---|---|
| **Responsibilities** | - To conduct imaginative research in physical chemistry.<br>- Application of CW- and Pulsed-ESR technique to the study of the interactions of organic adsorbates with paramagnetic centres within the structure and on surfaces of natural and synthetic smectite clay minerals and zeolites in the context of their catalytic activity.<br>- Non-official co-supervision of one M.Sc. Student (J.-M. Comets) | |
| **Competencies & Achievements** | - Expertise in theory and application of Electron Spin Resonance and Echo Modulation Spectroscopy techniques.<br>- Understanding of the structure, chemistry and surface chemistry of high surface area of layered aluminosilicate smectites and zeolites.<br>- Synthesis of smectites, pillared smectites and zeolites,<br>- Expertise in probing the interaction between surface bound paramagnetic centres and adsorbed reactant molecules.<br>- Catalytic studies of transition metal oxides. | |

## Successful Grant Applications

| | | |
|---|---|---|
| **2008-2011** | ARC Discovery Grant ARC DP0877428<br>"Synthesis of Functionalized Metal Oxide Beads with Hierarchical Pores for Radionuclide and Metal Sequestration" | R. Caruso (UoM) and V. Luca (ANSTO) |
| **2003-2006** | ARC Discovery Grant DP0664910<br>"Development of Nanocrystalline Transition Metal Oxide and Polymer-Transition Metal Oxide Composite Materials for Rechargeable Lithium Battery". | Skyllas-Kazacos (UNSW) and V. Luca (ANSTO) |

**N.B.** Under Australian government research grant funding rules ANSTO researchers can only participate as partner investigators on ARC grant proposals.

## Teaching Experience

| | | |
|---|---|---|
| **2017-present** | BSc 4$^{th}$ year courses. | University of San Martin, Argentina |

| | | |
|---|---|---|
| | Radioactive waste management and the chemistry of the nuclear fuel cycle.<br>Production of isotopes for medical diagnostics and therapy. | |
| **2007** | Lectures (12 h) on Advanced Nuclear Fuel Cycle Chemistry as part of a Masters in Applied Nuclear Science course being offered at the University of Sydney in 2008 (PHYS5016). | University of Sydney, Australia |
| **1995** | BSc (hons) lectures on molecular spectroscopy.<br>BSc lectures on chemical equilibrium. | University of New South Wales, Australia |
| **1984-1989** | Teaching Assistant in Inorganic Chemistry.<br>Position involved supervision of inorganic and analytical chemistry laboratories and conducting tutorials. | Victoria University of Wellington, New Zealand |

## Graduate Student Supervision

Supervised or co-supervised 14 PhD and MSc students.

## Most Recent Training Courses Attended

| | | |
|---|---|---|
| **21-25 Sep 2015** | IAEA-CNEA Workshop - Plasma Processing of Radioactive Wastes: Process Engineering, Flue Gas and Solid Wastes | Bariloche, Argentina |
| **5-9 Aug 2014** | Small-angle X-ray Scattering training course. | Bahia Blanca, Argentina. |
| **13–20 Sep 2013** | Argentine Radioprotection Society - Course on the Radiological Protection of Class II and III Nuclear Fuel Cycle Installations. | Buenos Aires, Argentina |
| **17-21 Sep 2012** | IAEA Workshop - Treatment and Conditioning of Radioactive Wastes. (Participant & Organizer). | Buenos Aires, Argentina |
| **17-19 Jun 2004** | Actinet Summer School - Thermodynamics and Kinetics of Liquid-Liquid Extraction. | Avignon, France |
| **12May-2Oct 2011** | Beninson Institute Course on the Methodology and Application of Radionuclides. | Buenos Aires, Argentina |

## Miscellaneous Professional Activities

Reviewer of numerous different scientific journals including: *Chemistry of Materials, Journal of Materials Chemistry, Journal of Physical Chemistry, Microporous and Mesoporous Materials.*

Reviewer of Australian Sychrotron EXAFS beamtime proposals 2004-2009.

Contributor to IAEA programs INPRO and WIRAF

Seminar program organizer at ANU for the year 1993

## Referees

Please consult for referees.

## Most Recent Selected Conference Presentations

| | | |
|---|---|---|
| Nov-2017 | Materials Research Society "Scientific Basis for Nuclear Waste Management, Sydney, Australia." (Invited) | Sydney, Australia |

| | | |
|---|---|---|
| Jun-2016 | Atalante 2016 - International Conference on chemistry of the Nuclear Fuel Cycle. (IAEA sponsored) | Montpellier, France |
| Sep-2013 | Global 2013 – International Nuclear Conference | Salt Lake City, USA |
| Jul-2008 | International Workshop on Preparation and Characterisation of Battery Cells. (Invited) | University of Wollongong, Australia |
| Aug-2007 | EUROPART International Workshop on Partitioning (Within the Framework of EURATOM Research Programme on Partitioning of Actinides) | |
| Oct-2005 | Environmental Nanoscience Workshop (Invited) | The Ian Wark Institute. Adelaide, Australia |
| Jun-2004 | 41st International Clay Minerals Society Meeting. (Invited) | Washington, USA |

## Publications

More than 110 research publications in high-impact peer-reviewed scientific journals. Full publication list can be supplied on request or downloaded at the following link.