

# GEORGE BEPETE

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## ACADEMIC APPOINTMENTS

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### Concordia University, Montreal, QC

Assistant Professor, Chemical and Materials Engineering 2024 – present

Assistant Professor, Department of Physics 2024 – present

### The Pennsylvania State University, University Park, PA

Assistant Research Professor, Department of Physics 2022 – 2024

## EDUCATION

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### University of the Witwatersrand, Johannesburg, South Africa

Ph.D., Chemistry 2014

Advisor: Prof. Neil Coville

Thesis: Chemical vapor growth of nitrogen doped carbon nanotubes for application in organic photovoltaic devices

### University of Zimbabwe, Harare, Zimbabwe

MSc, Renewable Energy 2009

### National University and Science and Technology, Bulawayo, Zimbabwe

Bsc (Hons), Applied Chemistry 2006

## HONORS AND AWARDS

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Francophone Carbon Society (SFEC) Young Scientist Award, 2017

## PAST RESEARCH EXPERIENCE

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### The Pennsylvania State University, Department of Physics, State College, PA 2017-2022

*Postdoctoral Research Advisor: Prof. Mauricio Terrones*

Primary responsibilities included research on the synthesis of 2-dimensional (2D) material nanosheets using reductive intercalation and dissolution of layered materials and their assembly into novel 2D material heterostructures and interfaces for application in catalysis, superconductivity, supercapacitors, alkali metal ion batteries and opto-electronics.

### Durham University, Department of Chemistry, UK 2016 – 2017

*Postdoctoral Research Advisor: Prof. Karl Coleman*

Primary responsibilities included research on the reductive dissolution of full length single walled carbon nanotubes (SWCNTs) and study of the electrical and optical properties of the individualized SWCNTs. Reductive functionalization of graphene into hydrogenated graphene and investigation of the relation between structure and properties for applications in opto-electronics.

### National Center for Scientific Research, CNRS, Bordeaux, France 2014 – 2026

*Postdoctoral Research Advisor: Prof. Alain Penicaud*

Primary responsibilities included research on the preparation of surfactant free dispersions of single layer graphene and individualized carbon nanotubes in water stabilized by hydroxide ions, using the reductive dissolution technique followed by transfer to water.

### University of the Witwatersrand, Johannesburg, South Africa 2010 – 2014

*PhD Advisor: Prof. Neil Coville*

Chemical vapor growth of nitrogen doped carbon nanotubes for application in organic photovoltaic devices.

### Rutgers University, Department of Material Science and Engineering, NJ 2011-2012

*Collaborator: Prof. Manish Chhowalla*

Chemical vapor growth of boron nitride doped graphene materials for application in organic photovoltaic devices.

## PATENTS

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7. **Bepete, G.**, Ratnayake, G., Qu, C., Yu Zhuohang, Sanchez, D., Perea-López, N., and Terrones, M. Solutions of coal-derived graphene quantum dots. **US Patent Application**. (2024)
6. Lei, Y., **Bepete, G.**, Ratnayake, G and Terrones, M. Liquid metal intercalation in layered materials and Related Products. **US Patent Application**. (2024)
5. Terrones, M., Lei, Y., Avvaru, V. S., Fujisawa, K., **Bepete, G.**, and Etacheri, V. “Defect-driven Ion Storage on Hexagonal Boron Nitride Anodes for High-Performance and Fire-Safe Lithium-Ion Batteries.” **US Patent Application**, 63/496,514 (2023).
4. **Bepete, G.**, Perea-López, N., and Terrones, M. “Electrophoretic deposition of hexagonal boron nitride films and coatings and their applications.” **US Patent Application**. 63/476,797 (2022)
3. **Bepete, G.**, Lei, Y., Perea-López, N., and Terrones, M. Methods for preparing hBN intercalation compounds, resultant products and uses thereof. **US Patent Application**, 63/267,561 (2022)
2. **Bepete, G.**, Wu, S., Lei, Y., Perea, N., Crespi, V. and Terrones, M. Exfoliation and dispersion of carbon nanotreads. **US Patent Application**, 63/263,471 (2021)
1. **Bepete G.**, Drummond C, Penicaud A. Aqueous and organic suspension of exfoliated nanocarbon materials, method for making same and uses thereof. **US Patent**, 10/414,935 (2019). *Licensed and commercialized by Carbon Waters France.*

## PEER-REVIEWED PUBLICATIONS

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19. Lin, Y., Torsi, R., Younas, R., Hinkle, C. L., Rigosi, A. F., Hill, H. M., Zhang, K., Huang, S., Shuck, C. E., Chen, C., Lin, Y., Maldonado-Lopez, D., Mendoza-Cortes, J. L., Ferrier, J., Kar, S., Nayir, N., Rajabpour, S., van Duin, A. C. T., Liu, X., Jariwala, D., Jiang, J., Shi, J., Mortelmans, W., Jaramillo, R., Marcelo, J.L., Engel-Herbert, R., Trofe, A., Ignatova, T., Lee, S. H., Mao, Z., Damian, L., Wang, Y., Steves, M. A., Knappenberger Jr., L. K., Wang, Z., Law, S. A., **Bepete, G.**, Zhou, D., Lin, J., Scheurer, M. S., Wang, P., Yu, G., Wu, S., Akinwande, D., Redwing, J. M., Terrones, M., Robinson, J. A. “Recent Advances in 2D Material Theory, Synthesis, Properties, and Applications.” *ACS Nano*, (2023)
18. Lei, Y., Zhang, T., Lin, Yu-Chuan., Granzier-Nakajima, T., **Bepete, G.**, Kowalczyk, D. A., Lin, Z., Zhou, D., Schranghamer, T. F., Dodda, A., Sebastian, A., Chen, Y., Liu, Y., Pourtois, G., Kempa, T. J., Schuler, B., Edmonds, M. T., Quek, S. Y., Wurstbauer, U., Wu, S. M., Glavin, N. R., Das, S., Dash, S. P., Redwing, J. M., Robinson, J. A., and Terrones, M. “Graphene and Beyond: Recent Advances in Two-Dimensional Materials Synthesis, Properties, and Devices.” *ACS Nanoscience Au*. 2 450–485 (2022).
17. Zhang, K.; Wang, Z.; Liu, H.; Perea-López, N.; Ranasinghe, J. C.; **Bepete, G.**; Minns, A. M.; Rossi, R. M.; Lindner, S. E.; Huang, S. X.; Terrones, M.; Huang, S. “Understanding the Excitation Wavelength Dependence and Thermal Stability of the SARS-CoV-2 Receptor-Binding Domain Using Surface-Enhanced Raman Scattering and Machine Learning. *ACS Photonics*, 9(9) 2963–2972 (2022)
16. Kahn, E., Liu, M., Zhang, T., Liu, H., Fujisawa, K., **Bepete, G.**, Ajayan, P.M. and Terrones, M. Functional hetero-interfaces in atomically thin materials. *Materials Today*, 37, 74-92 (2020).
15. **Bepete, G.** & Coleman, K.S., Carbon Nanotubes: Electronic Structure and Spectroscopy. *Comprehensive Nanoscience and Nanotechnology*, Volume 1, 205-218, (2019).
14. Naidek, N., Huang, K., **Bepete, G.**, Rocco, M.L., Penicaud, A., Zarbin, A. J. G., and Orth, E.S., Anchoring conductive polymeric monomers on single-walled carbon nanotubides: towards covalently linked nanocomposites., *New J. Chem.*, 43, 10482-10490 (2019).

13. **Bepete, G.**, Izard, N., Torres-Canas, F., Derré, A., Sbardelotto, A., Anglaret, E., ... & Drummond, C. Hydroxide Ions Stabilize Open Carbon Nanotubes in Degassed Water. *ACS Nano*, 12 (8), 8606-8615 (2018).
12. Kurapati, R., Mukherjee, S., Martín, C., **Bepete, G.**, Vazquez, E., Pénicaud, A., ... & Bianco, A. Single layer and few layer graphene are degraded by neutrophil myeloperoxidase. *Angewandte Chemie International Edition*, 57,11722 –11727 (2018).
11. **Bepete G**, Khan L, Coville NJ, Chiguvare Z., (N-doped) Carbon Nanotube Nanostructuring of the Hole Transport Electrode for Reduced Space-Charge Accumulation in Polymer-Fullerene Solar Cells. *physica status solidi A*, 214.11 (2017).
10. Chimowa, G., Tshabalala, Z. P., Akande, A. A., **Bepete, G.**, Mwakikunga, B., Ray, S. S., & Benecha, E. M. (2017). Improving methane gas sensing properties of multi-walled carbon nanotubes by vanadium oxide filling. *Sensors and Actuators B: Chemical*, 247, 11-18 (2017).
9. **Bepete G**, Anglaret E, Ortolani L, Morrandi V, Pénicaud A, and Drummond C, Surfactant-Free Single-Layer Graphene in Water. *Nature Chemistry*, 9, 347–352 (2017).
8. **Bepete G**, Pénicaud A, Drummond C and Anglaret E, Raman Signatures of Single Layer Graphene Dispersed in Degassed Water, “Eau de Graphene”. *The Journal of Physical Chemistry C* 120 (49), 28204–28214 (2016).
7. **Bepete G**, Hof F, Huang K, Kampioti K, Anglaret E, Drummond C, and Pénicaud A. “Eau de graphene” from a KC8 graphite intercalation compound prepared by a simple mixing of graphite and molten potassium. *physica status solidi (RRL) - Rapid Research Letters* 10 (12), 895-899 (2016).
6. Nongwe, I., **Bepete, G.**, Shaikjee, A., Ravat, V., Terfassa, B., Meijboom, R., & Coville, N. J. Synthesis of gold encapsulated in spherical carbon capsules with a mesoporous shell structure. A robust catalyst in a nanoreactor. *Catalysis Communications* 53, 77-82 (2014).
5. Ravat V, Nonqwe I, **Bepete G**, Meijboom R, Coville NJ. Pd on boron doped hollow carbon spheres - PdO particle size and support effects. *Journal of Catalysis* 305, 36-45 (2013).
4. **Bepete G**, Voiry D, Chhowalla M, Chiguvare Z, Coville NJ. Incorporation of small BN domains in graphene during CVD using methane, boric acid and nitrogen gas. *Nanoscale* 5(14), 6552-6557 (2013).
3. de Freitas JN, Maubane MS, **Bepete G**, van Otterlo WAL, Coville NJ, Nogueira AF. Synthesis and characterization of single wall carbon nanotube-grafted poly(3-hexylthiophene) and their Nano composites with gold nanoparticles. *Synthetic Metals*, 176, 55-64 (2013).
2. **Bepete G**, Tetana ZN, Lindner S, Rummeli M, Chiguvare Z, Coville NJ. The use of aliphatic alcohol chain length to control the nitrogen type and content in nitrogen doped carbon nanotubes. *Carbon* 52(2), 316 – 325 (2013).
1. Tetana ZN, Mhlanga SD, **Bepete G**, Krause RWM, Coville NJ. The Synthesis of Nitrogen-Doped Multiwalled Carbon Nanotubes Using a Fe-Co/CaCO<sub>3</sub> Catalyst. *South African Journal of Chemistry* 65, 39–49 (2012).

## TEACHING

**Instructor**, Concordia University, Montreal, QC

- PHYS 205: Electricity and magnetism

Winter 2024

**Teaching Assistant**, University of the Witwatersrand, Johannesburg, South Africa

- Inorganic chemistry
- General chemistry

2011

2011, 2012, 2013