

# Erick Romero

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PhD

## Professional Profile

Over the past six years I specialised in the development of multiple innovative nanofabrication processes for Nano Electro Mechanical Systems (NEMS), Photonics, Superconducting Circuits and Silicon on Insulator (SOI). These fabrication processes not only require a wide knowledge of material science, chemistry, nanoscience, optics and electronics, but also the technical skills for operating highly specialised cleanroom equipment. My expert knowledge in these areas is evidenced by my track record of more than 1000 hours of cleanroom experience at the Australian National Fabrication Facility (ANFF-Q) and Centre for Microscopy and Microanalysis (CMM). My extensive expertise includes highly specialised knowledge of advanced e-beam lithography, thin-film, and etching techniques. Additionally, I regularly use inspection and metrology techniques such as electron beam microscopy, optical profilometry and surface texture analysis. I am highly motivated to find new ways to integrate nanofabrication techniques into the most precise modern physics techniques.

## Professional Experience

2021-Present **Senior Professional Officer/Nanofabrication Specialist**, *Australian National Fabrication Facility, Queensland Node, The University of Queensland, Brisbane, QLD, Australia.*

Supervisor Anthony Christian

2018-2021 **Postdoctoral Research Fellow**, *The University of Queensland, Brisbane, QLD, Australia.*

Supervisor Prof. Warwick Bowen.

- Liaised with Australian Defence partners to develop high-sensitivity acoustic, inertial and magnetic sensors on silicon-on-insulator (SOI).
- Supervised PhD students.
- Designed, modelled and fabricated multi-step nano-electromechanical (NEMS) devices.
- Installed, managed and maintained a range of advanced scientific equipment and provided training for users.
- Wrote reports for defence partners, such as the Defence Science and Technology Group, of the Australian Department of Defence.
- Utilised advanced computer simulations to predict electromagnetic and mechanical behavior of microscopic systems.

2019-2020 **Chief Investigator**, *The University of Queensland, Brisbane, QLD, Australia.*

Scalable nanomechanical information processing. Linkage Project LP160101616 in partnership with Lockheed Martin

- Liaised with international industry partners and professional contacts, such as Lockheed Martin, to develop a nanomechanical platform.
- Wrote reports for industry partners regarding progress and achievements, such as Lockheed Martin
- Wrote scientific articles published in international journals.
- Procured scientific equipment, from obtaining supplier quotes to finalising purchases.
- Contributed to course development by discussions with Professors and course coordinators.

## Education

### PhD Physics

2014–2018 **The University of Queensland, Brisbane, QLD, Australia.**

Supervisor Prof. Warwick Bowen, *Phononics: Engineering and control of acoustic fields on a chip.*

- Designed, modelled, fabricated and tested silicon carbide (SiC) microelectromechanical (MEMS) devices for optomechanical experiments.
- Developed sophisticated backside etch processes for removing interfacial crystalline defects in epitaxially grown SiC.
- Routinely characterised and measured nanofabrication processes using stylus profiling and optical techniques, such as ellipsometry, optical profiling and white light reflectometry.

- Built optical experimental setup for high-precision measurements of nanomechanical system in ultra-high vacuum.
- Designed multi-layer nanofabrication processes in technical software such as L-Edit, K-layout or technical CAD drawings.
- Extensive experience using scanning electron microscopes.

#### MSc Optical Physics

2011–2013 **Center for Scientific Research and Higher Education at Ensenada**, *Ensenada*, Mexico.

Supervisor Prof. Kevin O'Donnell: Development of a highly efficient entangled photon pair source.

#### BSc Physics

2005–2011 **National Autonomous University of Mexico**, *Mexico City*, Mexico.

Supervisor Prof. Rocío Jáuregui: Dynamics of cold atoms interacting with the electromagnetic field of a cavity.

## Leadership and Communication

### International talks and workshops.

- In the past five years I have given more than 10 talks at international conferences and workshops. Among the most salient, I gave an invited talk in 2019 at the Nippon Telegraph and Telephone Corporation (NTT) in Atsugi, Japan. This invited talk was held at the prestigious International Symposium on Nanoscale Transport and Photonics, alongside Prof. Amir Safavi-Naeni (Stanford University), Prof Ivan Favero (Director of Research at CNRS) and Prof. Hiroshi Yamaguchi (Senior Distinguished Scientist of NTT), leading researchers in the fields of phononics, photonics, nanomechanics and sensing.

### Effective Communication.

- Wrote four first author scientific articles and one PhD dissertation in the past three years.
- Communicated regularly by phone, e-mail and video call with technical staff, collaborators and funding agencies across the globe.
- Current member of the public engagement committee of the *Australian Research Council Centre of Excellence for Engineered Quantum Systems*.

### Supervision and Training.

- Supervised and mentored three PhD students in experimental techniques and nanofabrication processes. This involves overseeing day-to-day lab operations, while ensuring correct OH&S procedures are maintained.

## Publications

- 2021 Leo Sementilli, **Romero Erick**, Warwick Bowen, *Nanomechanical Dissipation and Strain Engineering*, arXiv preprint arXiv:2105.14946, Accepted for publication in *Advanced Functional Materials*.
- 2021 (Equal Authorship) Mauranyapin N., **Romero, Erick**, et. al., *Tunnelling of transverse acoustic waves on a silicon chip*, *Phys. Rev. Applied*, 15, 054036 (2021).
- 2020 **Romero, Erick**, et. al., *Engineering the dissipation of crystalline micromechanical resonators*, *Phys. Rev. Applied*, 13, 044007 (2020).
- 2019 **Romero, Erick**, et. al., *Propagation and imaging of mechanical waves in a highly-stressed single-mode phononic waveguide*, *Phys. Rev. Applied*, 11, 064035, (2019).
- 2019 **Romero Sanchez E.**, *Phononics: Engineering and control of acoustic fields on a chip*, PhD Thesis, The University of Queensland (2019).
- 2018 **Romero, Erick**, et. al., *Quantum magnetomechanics: Towards the ultrastrong coupling regime*, *Phys. Rev. B*, 97, 024109 (2018).

## Patents

- 2021 **Romero, Erick**, et. al., *Nanophononic platform*, Provisional Patent, PAT-02396-AU-01, In Process.