Nicholas Domingo Ignacio

Ph.D. Candidate, Science and Engineering Program and Texas Materials Institute

Provost’s Early Career Fellow

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**Research Interests**

* Integration of 2D materials in PCM and RRAM for neuromorphic computing
* Crystalline-crystalline phase transformations for multilevel PCM.
* Electronic transport in low dimensional material devices
* Scanning transmission electron microscopy and scanning tunnelling microscopy (Cryogenic STM superuser at TMI)
* Materials Science pedagogy

**Education**

*08/2021 – current:* **Ph.D. Candidate** (advisor Prof. Deji Akinwande) Materials Science and Engineering Program and Texas Materials Institute, University of Texas at Austin, Austin, USA

*01/2020 – 06/2020:* **Visiting Student through Materials Exchange Program**, University of Oxford, Oxford, UK

*08/2017 – 06/2021:* **S.B. Materials Science and Engineering**, Massachusetts Institute of Technology, Cambridge, USA

**Awards, Honors & Certificates**

*12/2024:* **Professional Development Award**, University of Texas at Austin

*05/2024:* **2024 Provost’s Early Career Fellow**, University of Texas at Austin, Office of the Executive Vice President and Provost

*09/2023:* **Science Graduate Student Research (SCGSR) Fellowship**, U.S. Department of Energy, hosted by Oak Ridge National Lab, Center of Nanophase Materials Science, Scanning Tunneling Microscopy Group

*12/2022:* **Professional Development Award**, University of Texas at Austin

*08/2021*: **Virginia and Ernest Cockrell, Jr. Fellow**, University of Texas at Austin

*08/2021:* **T. W. Whaley, Jr. Scholarship**, University of Texas at Austin

**Professional Activities**

**Publications**

**In Preparation: N. D. Ignacio**, M. S. Hus, X. Zhan, C. Nelson, A.-P. Li, D. Akinwande, Layer-by-layer phase change in an In2Se3 based neuromorphic device

**N. D. Ignacio**, M. S. Hus, L. Li, J. Fatheema, L. Liang, SA.-P. Li, D. Akinwande, Impact of defects and electrode interfaces on resistive switching in hBN/Ag memristors

**N. D. Ignacio\***, N. Stern\*, G. Coloyan-Fleming, Promoting Graduate Engineering Communities and Sense of Job Satisfaction through Curating Department-Specific Teaching Assistant Support Programs

**Prepress:** S. Kutagulla, M. Coupin, D. Mutyala, C. Favela, **N. D. Ignacio**, N. H. Le, I. Terry, C. Bohn, J. Warner, N. Aluru, B. Korgel, D. Akiwnande, Ozonated monolayer graphene for extended performance and durability in hydrogen fuel cell electric vehicles *Adv Mater (2024)* **In Review**

M. Floto\*, **N. D. Ignacio**\*, R. Ciufo, D. Akinwande, C.B. Mullins, Hydrogen-Induced Surface Reconstruction of Co(poly) Studied by STM *Phys. Chem. Chem. Phys (2024)* **In Review**

**Published:** Y. Jeon, D. Kim, C. Biswas, **N. D. Ignacio**, P. Carmichael, S. Feng, K Lai, D.-H. Kim, D. Akinwande, Enhanced Synaptic Memory Window and Linearity in Planar In2Se3 Ferroelectric Junctions *Adv Mater (2024)*

Y. Lee, Y. Hunag, Y.-F. Chang, S. J. Yang, **N.D. Ignacio**,S. Kutagulla, S. Mohan, S. Kim, J. Lee, D. Akinwande, S. Kim, Programmable Retention Characteristics in MoS2-Based Atomirsotrs for Neuromorphic and Reservoir computing Systems, *ACS Nano* (2024)

J. Xie, Md. Patoary, R. Laskar, Md. A. Rahman Laskar, **N. D**. **Ignacio**, X. Zhan, U. Celano, D. Akinwande, I. Sanchez Esqueda, Quantum conductance in vertical hexagonal boron nitride memristors with graphene-edge contacts, *ACS Nano Lett.* (2024)

**N. D. Ignacio**, J. Fatheema, Y. Jeon, D. Akinwande, Air-stable atomically encapsulated crystalline-crystalline phase transitions in In2Se3, *Adv Elec Matr* (2023)

S. Mohan, D. Kireev, S. Kutagulla, **N. D. Ignacio**, Y. Gu, H. Celio, X. Zun, D. Akinwande, K. Liechti, Direct, Metal-free Growth and Dry Separation of Bilayer Graphene on Sapphire: Implications for Electronic Applications, *ACS Appl. Nano Mater* (2023)

Y. Huang\*, Y. Gu\*, S. Mohan, A. Dolocan, **N. D. Ignacio**, S. Kutagulla, K. Matthews, A. Londoño-Calderon, Y.-F Chang, Y.-C. Chen, J. Warner, M.T. Pettes, J.C. Lee, D. Akinwande, Reliability improvement and effective switching model of thin-film MoS2  memristors**,** *Adv Funct Mater* (2023)

***\**** *Denotes equal contribution*

**Conferences**

Presentations

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| *12/2024:* | **“Defects and interfaces in atomristors: a study of a hexagonal boron nitride device”,** Materials Research Society (MRS) Fall 2024 Meeting, (Boston, Ma, USA) |
| *12/2024:* | **“Multi-step resistance switching by crystalline-crystalline phase changes in In2Se3”,** Materials Research Society (MRS) Fall 2024 Meeting, (Boston, Ma, USA) |

Posters

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| *11/2023:* | **“Structural Phase Transitions for Multi-Level In2Se3 Based Phase Change Memory”,** Materials Research Society (MRS) Fall 2023 Meeting, (Boston, Ma, USA) |
| *11/2022:* | **“Control of Crystalline-Crystalline Phase Changes in In2Se3 by**  **Encapsulation”,** Materials Research Society (MRS) Fall 2022 Meeting, (Boston, Ma, USA) |

*06/2022:* **“Hydrogen-Induced Surface Reconstruction of Co(poly) Studied by STM”,** 82nd PEC Meeting 2022, (Chicago, IL, USA)

**Member**

American Chemical Society (ACS)

American Society of Mechanical Engineers (ASME)

Materials Research Society (MRS)

American Physics Society (APS)

**Teaching Experience**

*08/2024 – 12/2024:* **Graduate Instructor**, Experiments in Materials Science & Engineering (MSE360M), Dept. of Mechanical Engineering, UT Austin, Dr. Derek Davies

*01/2023 – 05/2023:* **Teaching Assistant/Supplementary Instruction Leader**, Introduction to Astronomy (AST301), Dept. of Astronomy, UT Austin, Prof. Paul Shapiro

*05/2022 – 08/2022:* **Teaching Assistant**, Materials Engineering (ME334), Dept. of Mechanical Engineering, UT Austin, Dr. Jeremiah McCallister

*09/2019 – 12/2019:* **Teaching Assistant/Recitation Leader**, Introduction to Solid State Chemistry (3.091), MIT, Prof. Jeff Grossman

**Pedagogical Training**

*08/2022 – 12/2024:* **Graduate Certificate in Engineering Education**, Cockrell School of Engineering, UT Austin

*08/2023 – 12/2023:* **Teaching Preparation Certificate**, Center for Teaching and Learning, UT Austin

*06/2023:* **Inclusive Classrooms Leadership**, Division of Diversity and Community Engagement, UT Austin

*02/2023:* **K-12 Outreach Certificate**, CDCM MRSEC, University of Texas at Austin

**Mentoring Experience**

*2023:*Ikel Hernandez, REU at UT Austin, Texas State University

(current: graduate student, Drexel University)

**Service & Outreach**

*Reviewer for:*ACS Nano, Journal of Emerging Investigators

*(2023 – current)*

*08/2023 – current:* UT Austin Materials Research Society President

*08/2023 – current:*UT Austin Graduate Engineering Council Financial Director

*08/2023 – current:*UT Austin Graduate Student Assembly Materials Science representative

*09/2022 – 09/2023:*Cockrell School of Engineering DEI board member

*02/2022 – current:*K-12 STEM outreach through UT MRSEC in local elementary schools

*08/2021 – current:*MIT Education Councilor (Interview prospective undergraduates)

*08/2020 – 06/2022:*MIT First year associate advisor

*08/2020 – 06/2022:* MIT Undergraduate associate advising steering committee member

*06/2020 – 06/2022:*Department Representative on DEI board of MIT Undergraduate Association

*08/2020 – 06/2021:*Vice President of Society of Undergraduate Materials Scientists at MIT

*08/2018 – 08/2021:*Department of Materials Science Freshmen Pre-orientation program mentor and coordinator

**Professional Experience**

*08/2020 – 07/2021:* **SLS Materials Engineer**, Formlabs

*06/2019 – 08/2019:* **Low Observable Materials Intern**, Lockheed Martin Skunkworks

*01/2019:* **Low Observable Materials Intern**, Lockheed Martin Skunkworks

**References**

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