DONALD INTAL

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MACHINE LEARNING AND SOLAR MATERIALS ENGINEER

Ph.D. candidate in Electrical Engineering specializing in **photovoltaic technology**, **materials innovation**, and **data-driven optimization**. Experienced in advanced **metallization strategies**, **materials characterization**, and **ML-enhanced solar device modeling**. Proficient in **Python**, **MATLAB**, and scientific publishing.

EDUCATION

Ph.D. in Electrical Engineering (Expected Spring 2026)
University of North Carolina at Charlotte, Charlotte, NC

- Advisor: Dr. Abasifreke Ebong

M.S. in Electrical Engineering (2021 – 2024)
University of North Carolina at Charlotte, Charlotte, NC | GPA: 3.5/4
B.S. in Electrical Engineering (2018 – 2021)
University of North Carolina at Charlotte, Charlotte, NC | GPA: 3.3/4

RESEARCH EXPERIENCE

Graduate Research Assistant, Ebong Research Group, UNCC (Aug 2021 – Present)

- Advanced **screen-printable copper (Cu) pastes** for **PERC silicon solar cells**, achieving **~19% efficiency**.
- Investigated **cost-reduction strategies** via **atmospheric Ag-coated Cu paste**, reaching **>19% efficiencies**.
- Published research in **peer-reviewed journals** and presented at **international conferences**

TECHNICAL SKILLS

- **Machine Learning & Data Science**: TensorFlow, PyTorch, Scikit-Learn, Data Augmentation
- **Programming & Scripting**: Python, MATLAB, R, Bash
- **Data Analysis & Visualization**: Pandas, NumPy, Excel, Matplotlib, Seaborn, plotly
- **Electrical Engineering & Design**: Circuit Analysis, AutoCAD, PCB Layout/Design
- **Material Characterization**: XRD, SEM, AFM, TEM, FIB, SIMS, Raman Spectroscopy
- **Other Tools**: Git (version control), Jupyter Notebooks, LaTeX
- **Operating Systems**: Windows, Linux

TEACHING & MENTORSHIP

Graduate Teaching Assistant, UNCC (2021–2024)

- Supported instruction for **Electromagnetic Fields**, **Electromagnetic Waves**, **Semiconductor Fundamentals**, and **Electronics** courses.
- Facilitated labs focused on **instrumentation**, **circuit design**, and **safety protocols**.

CERTIFICATION & MEMBERSHIPS

- **Fundamentals of Engineering (FE)**, Electrical & Computer, NCEES
- **Member**, IEEE-HKN (2021–Present)

SELECT PUBLICATIONS & PROJECTS

- ***Thin-Film Solar Photovoltaics: Trends and Future Direction***. IEEE HONET, 2024.

Comprehensive review of **thin-film PV technologies** (CdTe, CIGS, perovskites), highlighting **efficiency trends, market growth**, and **emerging innovations**.

- ***Screen Printable Copper Pastes for Silicon Solar Cells***. Solar Energy Materials and Solar Cells, 2024.

Demonstrated **cost-effective Cu metallization** with **antioxidant barriers**, achieving **19% efficiency** without Ag and confirmed **no diffusion into Si**.

- ***Cavitated Ag Paste for Next Generation Solar Cells***. AIP Advances, 2024.

Introduced **ultrasonic cavitation** for paste production, enabling **21% efficiency** with reduced **Ag usage**, better **dispersion**, and **extended shelf life**.

- ***Ag-Coated Cu Paste for Crystalline Silicon Solar Cells***. IEEE HONET, 2023

Evaluate **Ag-coated Cu paste** made via cavitation with **>19% efficiency**, offering **silver reduction** while minimizing **Cu diffusion risk**.

- ***Surface-Engineered Carbon Nanotubes in Ag Paste for Enhanced Durability.*** IEEE PVSC, 2024.

Improved **mechanical durability** of gridlines using **SE-CNTs**, maintaining **~22.3% efficiency** while increasing **thermal cycling resilience**.