

Benard Tabu

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LINKS	https://www.linkedin.com/in/benard-tabu-ph-d-37a87979/ ; https://www.researchgate.net/profile/Benard-Tabu ; https://www.uml.edu/differencemaker/Meet-the-DifferenceMakers/green-fertilizer.aspx ;	
RESEARCH AND TECHNICAL SUMMARY	Plasma physicist and energy engineer with over six years of experience designing, building, and operating high-power plasma systems (100–300 kW). Experience in plasma diagnostics, high-voltage systems, and large-scale experimental campaign leadership. Strong record of publishing, mentoring, and collaborating on international research projects. Motivated by the challenge of advancing fusion energy through innovative plasma science and engineering.	
PROFILE	Significant knowledge and skills in: ● Plasma Diagnostics (OES, spectroscopy, high-speed imaging) ● Curriculum Development and Pedagogy ● Nonthermal Plasma Reactor Conceptualization, Design, and Prototyping ● Chemical Products Analysis (GC, FESEM, EDX) ● Experimental Design and Data analysis ● Design and Simulation Tools: MATLAB, SolidWorks, exposure with ANSYS/COMSOL ● Team Leadership, Mentoring, and Operator Training ● Excellent Analytical and Communication Skills	
EDUCATION	Ph.D. in Energy Engineering, University of Massachusetts at Lowell	Lowell, USA
Sep 2019 — May 2023	● Outstanding performance, 3.86/4.00	
Aug 2015 — Aug 2017	Master of Science in Physics, Makerere University	Kampala, Uganda
	● Graduated with honors, 4.19/5.00	
Aug 2007 — Jul 2010	Bachelor of Science Education (Physical), Gulu University	Gulu, Uganda
	● Graduated with honors, second class upper, (4.30/5.00)	
RELATED EXPERIENCES	Senior Scientist, Heartland (formerly Heartland Water Technology Inc.)	Tennessee, USA
Oct 2024 — Oct. 2025	● Designing test matrices to optimize the performance of Heliostorm valorizing different feedstocks ● Initiating and managing multiple projects in mechanical, electrical, and electronic engineering for the development of the commercial unit ● Analyzing and sharing the results of different tests to inform the company on the strategic directions of the project. ● Designing electrodes and evaluating the performance of the plasma gasifier in both lab and industrial settings. ● Undertaking any other technical and administrative role assigned.	
RELATED EXPERIENCES	Developmental Scientist, Maat Energy	Cambridge, USA
May 2023 — Aug 2024	● Managed the design of experiments for the pyrolysis and dry reforming program for commercial-scale unit development. ● Initiated and managed multiple projects in mechanical, electrical, and electronic engineering for the development of the commercial unit ● Operated and optimized a 100-kW microwave plasma system for pyrolysis and dry reforming. ● Performed plasma diagnostics via optical emission spectroscopy.	

	• Used MatLab to analyze the performance of the different components of the system. • Designed using SolidWorks, different components of microwave plasma reactors. • Modified LabView program for different measurements and controls,		
RELATED EXPERIENCES Sep 2019 — May 2023	Research Assistant/Ph.D. Candidate, University of Massachusetts Lowell		Lowell, USA,
	• Designed, characterized, and built low-temperature atmospheric pressure plasma reactors for chemical synthesis • Performed experimental plasma diagnostics using spectroscopy and high-speed camera • Characterized carbon co-products using FESEM and EDX • Analyzed complex and enormous experiment data for results dissemination through presentations and journal articles • Collaborated in multiple research projects with other departments and research groups • Initiated the development and prototyping technology that generates fertilizer locally via plasma • Analyzed complex and enormous experiment data for results dissemination through presentations and journal articles		
ADDITIONAL EXPERIENCES May 2018 — Aug 2019	Assistant Lecturer, Gulu University		Gulu, Uganda
	• Taught and assessed undergraduate elements of astronomy and astrophysics, waves and optics, atomic physics, physics practical, and classical mechanics II • Designed, reviewed, and implemented curriculum for undergraduate students • Engaged and supervised final-year students in renewable energy research, such as dye-Sensitized Solar cells, Solar thermal cookers • Mentored, supported, and guided undergraduate students		
Oct 2013 — Apr 2018	Teaching Assistant, Gulu University		Gulu, Uganda
	• Taught and assessed undergraduate solid-state physics II, classical mechanics, microwave and fiber optics, and nuclear physics. • Designed, reviewed, and implemented curriculum for undergraduate students • Engaged and supervised final-year students in renewable energy research, such as dye-Sensitized Solar cells, Solar thermal cookers • Mentored, supported, and guided undergraduate students		
Jul 2010 — Sep 2013	Education officer, Gulu High School		Gulu, Uganda
	• Taught high school mathematics and physics; encouraged many students to pursue advanced physics and mathematics • Mentored, supported, and guided high school students		
HOBBIES	Running, watching football, reading, traveling, and group formation		
LANGUAGES	English	Highly proficient	Acholi Native speaker
PROFESSIONAL MEMBERSHIP	1. American Physical Society (APS) 2. IEEE Nuclear and Plasma Sciences Society Members (IEEE NPSS) 3. International Low-Temperature Plasma Community (ILTPC)		

**AWARDS/
SCHOLARSHIPS**

Apr 2023	1. Energy Engineering Outstanding Doctoral Student Award for exceedingly excellent performance academically and non-academically in the Department of Mechanical and Industrial Engineering of UMass Lowell
Dec 2022	2. VentureWell Stage 2 E-Team; amount (\$ 20,000) for developing green fertilizer technology
Sept 2022	3. VentureWell Engineering for One planet (EOP); amount (\$ 800) for developing strategies for institutionalization and propagation of EOP
Apr 2022	4. UML Sustainability Engagement and Enrichment Development (SEED) Fund; amount (\$ 8,000) for developing green fertilizer technology
Feb 2022	5. VentureWell Stage 1 E-Team; amount (\$ 5,000) for developing green fertilizer technology
Jan 2022	6. VentureWell Innovator Stipend Program; amount (\$ 1,500) for developing green fertilizer technology
Aug 2021	7. ICOPS 2021 Paul Phelps Continuing Education Grants; amount (\$ 100); for attending conference minicourse
Apr 2021	8. UML DifferenceMaker Idea Challenge; amount (\$ 4000); for developing a green fertilizer system which produces nitrogen nutrient from air and water using solar energy
May 2019	9. Fulbright scholarship; amount (\$ 92,097); for pursuing doctoral studies in Energy Engineering at the University of Massachusetts Lowell
Feb 2016	10. Sida-Makerere University Bilateral Scholarship; amount (\$ 13,524) for pursuing Master of Science in Physics degree at Makerere University
Aug 2007	11. Government sponsorship, National Merit; amount (\$ 2,778) for pursuing Bachelor degree at Gulu University
Jan 2021	12. Gulu District Bursary; amount (\$ 400) for pursuing secondary education at St. Joseph's College Layibi

REVIEWER

1. Journal of Energy Storage, Impact factor, 9.4
2. Engineering Research Express, Impact factor, 1.7
3. Environmental Research: Energy
4. Journal of Physics D: Applied Physics, 3.1
5. Sustainability Science and Technology, 5.3
6. Fuel
7. International Journal of Hydrogen Energy

**SELECTED
PUBLICATIONS**

1. **Tabu, B.**, Kong, P., Henderson, J., & Davis, B. (2025). Critical Review of Proliferation, Regulation, and Thermal Plasma Remediation of PFAS in Solid Waste. *Journal of Environmental Chemical Engineering*, 120238.
 2. Boules, A., **Tabu, B.**, Brack, E., Alexander, T., Mack, J. H., & Trelles, J. P. (2024). Hydrogen production synergy in non-thermal plasma copyrolysis of low-density polyethylene and cellulose. *International Journal of Hydrogen Energy*, 65, 375-380.
 3. **Tabu, B.**, Veng, V., Morgan, H., Das, S.K, Brack, E., Alexander T., Mack, J.H., Wong, H.W. and Trelles, J.P. Hydrogen from Cellulose and Low-density polyethylene via atmospheric pressure nonthermal plasma. *International Journal of Hydrogen Energy*,
 4. **Tabu, B.**, Akers, K., Yu, P., Baghirzade, M., Brack, E., Drew, C., Mack, J.H., Wong, H.W. and Trelles, J.P., 2022. Nonthermal atmospheric plasma reactors for hydrogen production from low-density polyethylene. *International Journal of Hydrogen Energy*, 47(94), pp.39743-39757.
 5. Veng, V., **Tabu, B.**, Simasiku, E., Landis, J., Mack, J. H., Carreon, M., & Trelles, J. P. (2023). Design and Characterization of a Membrane Dielectric-Barrier Discharge Reactor for Ammonia Synthesis.
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6. **Tabu, B.**, Baghirzade, M., Akers, K., Yu, P., Brack, E., Drew, C., Mack, J.H., Wong, H.W. and Trelles, J.P., 2021, September. Plasma and Flow Dynamics in Gliding-and Transferred-ARC Reactors for Hydrogen Production from Polyethylene. In *2021 IEEE International Conference on Plasma Science (ICOPS)* (pp. 1-1). IEEE.
7. **Tabu, B.**, Baghirzade, M., Akers, K., Yu, P., Brack, E., Drew, C., Mack, J.H., Wong, H.W., & Trelles, J. P. (2021, November). Design and Evaluation of Nonthermal Plasma Reactors for Hydrogen Production from Polyethylene. In *2021 AIChE Annual Meeting 2021*
8. Veng, V., **Tabu, B.**, Amhed, H., Wong, H.W., & Trelles, J. P. (2021, November). Performance of a Concentrated Solar–Gliding Arc Plasma Reactor for CO₂ Decomposition: Effect of Catalyst Monolith. In *2021 AIChE Annual Meeting 2021*
9. **Tabu, B.** & Spencer, M. (2021). Innovative approach to learning and teaching of sciences in Africa. Deciphering the discipline–Guest columnist. *American Ceramic Society Bulletin*, Vol. 100, No. 8 (pp-50)
10. **Tabu, B.**, Baghirzade, M., Akers, K., Yu, P., Brack, E., Drew, C., Mack, J.H., Wong, H.W., & Trelles, J. P. (2021, September). Plasma and Flow Dynamics in Gliding-and Transferred-ARC Reactors for Hydrogen Production from Polyethylene. In *2021 IEEE International Conference on Plasma Science (ICOPS)* (pp. 1-1). IEEE.
11. **Tabu, B.**, Nyeinga, K., Chaciga, J., & Okello, D. (Dec., 2018). Thermal performance of selected oils in Uganda for indirect solar domestic cooking applications. *Tanzania Journal of Science*, 44(4).
12. Chaciga J., Nyeinga, K., **Tabu, B.**, & Okello, D. (Dec., 2018). Construction of a High Temperature (~ 200 C) Oil Pump for Solar Thermal Energy Storage System for Cooking Applications. *Tanzania Journal of Science*, 44(4).
13. Nyeinga, K., Okello, D., **Tabu, B.**, & Nydal, O.J. (2017). Experimental Investigation of Thermal Performance for Selected oils for Solar Thermal Energy Storage and Rural Cooking Application. *IEA SHC International Conference on Solar Heating and Cooling for Buildings and Industry, ISES Solar World Congress 2017*.

PROJECTS

Jul 2021—to date	Co-PI. Green fertilizer; amount (\$ 38500)
Sep 2019—May 2023	Lead Researcher. Hydrogen production from solid via atmospheric nonthermal plasma; amount (\$ 180,000)
Mar 2016—Nov 2017	Lead Researcher. Solar thermal energy storage for domestic cooking applications

SCIENTIFIC

CONFERENCES

1. Spark Dielectric Barrier Discharge for Hydrogen Production from Biomass. *ICOPS 2023. Poster Presentation. May 20-25, 2023. Santa Fe, NM, USA*
2. Production of Hydrogen from Plastic and Biomass Waste Via Low-Temperature Plasma. *Gordon Research Conference. Poster Presentation. July 24-29, 2022. Proctor Academy in Andover, New Hampshire, USA*
3. Plasma Reactors for Hydrogen Production from Plastic Waste. *21st Tripathy Memorial Symposium. Poster Presentation. December 03, 2021. University of Massachusetts Lowell, MA, USA*
4. Experimental l Evaluation of Nonthermal Plasma Reactors for Hydrogen Production from Polyethylene. *2021 AIChE Annual Meeting. Oral Presentation. November 7-11, 2021. Boston, MA, USA*
5. Plasma and Flow Dynamics in Gliding-and Transferred-arc reactors for hydrogen production from polyethylene. *ICOPS 2021. Oral Presentation. September 12-16, 2021. Virtual*
6. Design and modeling of atmospheric pressure nonthermal plasma for hydrogen extraction from solids. *JUAMI Open Computing Facility Symposium. Oral Presentation. May 18-19, 2021.Virtual*
7. Thermal performance of a model parabolic disc for solar domestic cooking applications in Northern Uganda. *Gulu University 5th Annual Conference, November 7-8, 2018. Gulu, Uganda.*
8. Experimental evaluation of thermal performance of selected oils in Uganda for indirect solar domestic cooking applications. *PAUWES Research2Practice Forum. Oral Presentation. April 16-18, 2018. University of Tlemcen, Algeria.*
9. Thermal performance of selected oils in Uganda for indirect solar domestic cooking applications. *2nd Material Science and Solar Energy for Eastern and Southern Africa Conference (MSSEESA). Oral presentation. November. 30-2 December 2017, University of Dar-es-Salaam, Tanzania*

WORKSHOPS AND

TRAINING

1. First Aid and Fire Safety. May 3, 2024. Cintas First Aid and Safety. Cambridge, MA, USA
 2. AEE World Energy Conference and Expo. Energy Efficiency and Sustainability in Built Environment. September 21-23, 2022, Atlanta, Georgia, USA.
 3. VentureWell, Engineering for One Planet (EOP). EOP Scaling for Impact Workshop. June 21-23, 2022. Online
 4. VentureWell, E-Team Pioneer Workshop Spring 22. New Jersey Institute of Technology (NJIT), May 2-3, 2022, NJ, USA
 5. Harassment Prevention and Title IX. March 11, 2022. UMass Lowell. MA, USA
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	- UMass Lowell Environmental and Emergency Management. Laboratory Safety Training. October 2020, UMass Lowell, MA, USA - Scholarly Writing and Publishing for Academics in East Africa. March 12-16, 2019. DAAD AUGU/DAAD Nairobi. Entebbe Uganda - Joint Undertaking for an African Materials Institute (JUAMI). <i>Makerere University, December 2018. Kampala, Uganda</i> - International Training Programme in Solar Energy Application and Technologies. National Institute of Solar Energy. November/December 2017, India - Biofarming Training School. Addis Ababa University, September 2014, Ethiopia - MoES Uganda. Secondary Science and Mathematics Teachers Programme. Inservice Training, Physics. May 7-11, 2012. Gulu, Uganda	
MEDIA	https://omnexus.specialchem.com/news/industry-news/new-method-to-extract-hydrogen-from-plastic-waste-000230477 https://www.uml.edu/news/stories/2023/trelles-hydrogen-from-plastic-waste.aspx https://www.uml.edu/news/stories/2022/hsi-wu-wong-doe-grant.aspx https://www.eurekalert.org/news-releases/528317 https://heartsoundsus.org/benard-tabu/ https://www.blacklowellcoalition.com/authorsandacademia https://venturewell.org/venturewell-2022-year-in-review/ https://www.massachusetts.edu/news/seed-fund-recipients-all-about-green https://ceramics.org/wp-content/bulletin/2021/OctNov2021/OctNov2021.html#p=50 https://www.lemelson.org/celebrating-black-inventors-innovators/ https://www.uml.edu/differencemaker/meet-the-differencemakers/green-fertilizer.aspx	
EXTRA-CURRICULAR ACTIVITIES		
Jan 2022—to date	Board Member. Heart Sounds NGO Providing technical advisory services to the organization	Massachusetts, USA
Jun 2021—May 2022	President. Graduate Solar Energy Association Overseeing the activities of the Graduate Solar Energy Association at the University of Massachusetts Lowell (UML) and outside	UML, USA
Aug 2018—Dec 2020	Co-founder (August 2018-date). SUN TEL Holdings Limited Providing solar PV and Information Technology services such as PV system installation, mobile app development, and PV system sizing	Gulu, Uganda
Aug 2016—Aug 2019	University Coordinator (2016-date). Scibridge Project. Coordinating all the Scibridge Project activities in the Department of Physics	Gulu University, Uganda
Mar 2017—Aug 2019	University Coordinator. African Network for Solar Energy (ANSOLE). Coordinating the activities of ANSOLE at Gulu University	Gulu University, Uganda
Sep 2017—Aug 2019	Patron. Gulu University Physics Society. - Mentoring students both within and outside the Department of Physics - Carrying out career guidance for freshers and continuing students	Gulu University, Uganda
Oct 2015—Sep 2016	President. Acholi Students Union.	Uganda

- Overseeing all the activities of Acholi Students' Associations in all the tertiary institutions in Uganda
- Engaging traditional and religious leaders in the promotion of peace, good cultural practices, and harmony in a concerted effort to recover the lost values during the Lord Resistance Army (LRA) war in Northern Uganda

REFERENCES

Prof. Juan Pablo Trelles, University of Massachusetts Lowell

Juan_Trelles@uml.edu, (978) 934-4973

Dr. Peter Kong, Chief Scientist, Heartland (formerly Heartland Water Technology Inc.)

ifplasma@aol.com

Prof. Hunter John Mack, University of Massachusetts Lowell

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