

Advancing Plasma Medicine: Innovations and Perspectives for Sustainable Healthcare in Thailand

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Abstract

Plasma medicine has emerged as a transformative field, integrating plasma physics with biomedical applications to address critical healthcare challenges. In Thailand, the adoption of plasma technology in medicine is still in its early stages, with growing interest from researchers, universities, and industries. This presentation highlights the advancements in plasma technology for medical applications, with a focus on its status and future potential in the Thai context. Key areas of exploration include plasma-based sterilization techniques, the inhibition of microbial growth, and the therapeutic use of plasma-generated reactive species such as nitric oxide (NO), hydroxyl radicals (OH), and hydrogen peroxide (H₂O₂). Recent studies in Thailand, including the optimization of plasma systems for sterilization and reactive species production, demonstrate the potential of plasma medicine in improving healthcare standards, particularly in sterilization, wound healing, and antimicrobial treatments. From a national perspective, Thailand's strategic approach to plasma technology involves fostering collaborations between universities, research institutions, and private sectors to build capacity and expertise. Plasma medicine is poised to play a critical role in addressing healthcare challenges, such as antimicrobial resistance and sterilization in resource-limited settings, while contributing to Thailand's vision for sustainable healthcare solutions. This presentation also discusses ongoing collaborations, including plasma-assisted synthesis of biomolecules and rare sugars, which position plasma technology as a driver of innovation in Thailand's healthcare and pharmaceutical industries. By integrating experimental design, plasma engineering, and medical applications, this work emphasizes the significant role of plasma medicine in shaping a sustainable and resilient healthcare future for Thailand.

Keywords: Plasma Medicine, Reactive Species, Sterilization, Sustainable Healthcare, Thailand Innovation

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Expertise:	Micro Electromechanical System (MEMS), Optimization, Manufacturing and rapid prototyping for biomedical application, Plasma technology



Education History

[Doctorate]	2005	Asian Institute of Technology, Thailand (Industrial Engineering) D.Eng
[Master]	1998	Asian Institute of Technology, Thailand (Industrial Engineering) M.Eng
[Bachelor]	1996	Chiang Mai University, Chiang Mai, Thailand (Industrial Engineering) B.Eng



Professional Background

2005	Assistant Dean for Academic Affairs Faculty of Engineering, Chiang Mai University, Chiang Mai, Thailand
2006-2008	Assistant Dean for Quality Assurance Faculty of Engineering, Chiang Mai University, Chiang Mai, Thailand
2009-2012	Associate Dean for Student Development Affairs and Quality Assurance Faculty of Engineering, Chiang Mai University, Chiang Mai, Thailand
2013-2018	Director of Research Administration Center, Chiang Mai University, Chiang Mai, Thailand
2019	Deputy Director of Budget Allocation Division, Thailand Science Research and Innovation (TSRI), Thailand
2021	Director of the Brain Power and Knowledge Institutes Development Division Thailand Science Research and Innovation (TSRI), Thailand
2021-Present	Deputy Director of Thailand Science Research and Innovation (TSRI), Thailand



Selected Awards and Honors

1. Outstanding Alumni Award of the Faculty of Engineering, Chiang Mai University (Year: 2018)
2. Chairperson of the Advisory Committee for an Outstanding Dissertation (1 case), Chiang Mai University
3. Chairperson of the Advisory Committee for Highly Commended Dissertations (2 cases), Chiang Mai University
4. Chairperson of the Advisory Committee for a Highly Commended Thesis (1 case), Chiang Mai University
5. **Award for Expertise and Excellence in Advanced Plasma Technology Research**
Presented at the International Conference on Industrial Engineering and Operations Management
6. **Outstanding Administrative Management Award, Chiang Mai University (Year: 2014)"Silver Medal" and "Bronze Medal" Awards for Innovation Presentation At the 49th Geneva International Exhibition of Inventions (April 17–21, 2024), Palexpo, Geneva, Switzerland**
7. **NRCT Quality Achievement Award 2024** in Engineering and Industrial Research for Raw Milk Abnormality Detection Device



Selected Publications

1. Keawkaew, J., Phiphattanaphiphop, C*, Leksakul, K.,**, Phatthanakun, R., Khamlor, T., “The optimal solution of microfluidic device for separating white blood cells in raw milk,” in Sensors and Actuators: A. Physical, 382, (2025), 116124.
2. Suedumrong, C., Phongmoo, S., Akarajaka, T., & Leksakul, K. (2024). Diabetic Retinopathy Detection Using Convolutional Neural Networks with Background Removal, and Data Augmentation. Applied Sciences, 14(19), 8823.
3. Sojithamporn, P., Leksakul, K., Sawangrat, C., & Boonyawan, D. (2024). Optimizing plasma-activated water for enhanced microbial control in agricultural produce processing. LWT, 208, 116677.
4. Yawut, N., Mekwilai, T., Vichiansan, N., Braspaiboon, S., Leksakul, K., & Boonyawan, D. (2024). Cold Plasma Technology: Transforming Food Processing for Safety and Sustainability. Journal of Agriculture and Food Research, 101383.
5. Vichiansan, N., Phanumong, P., Mekwilai, T., ... Lumyong, S., Boonyawan, D. (2024). Effect of Plasma-Activated Water (PAW) on the Shelf Lives of Whiteleg Shrimp (Litopenaeus vannamei) and Splendid Squid (Loligo formosana). Food and Bioprocess Technology, 2024, 17(9), pp. 2644–2660
6. Sojithamporn, P., Leksakul, K., Sawangrat, C., Boonyawan, D. (2024). Optimizing plasma-activated water for enhanced microbial control in agricultural produce processing. LWT, 2024, 208, 116677. <https://doi.org/11.1016/j.lwt.2024.116677>