

## **ABSTRACT:**

### **Nanotechnology: Innovative Applications of Laser Ablation**

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In the rapidly evolving field of nanotechnology, laser ablation has emerged as a versatile and powerful tool for material processing and surface engineering. This invited talk will explore innovative applications of laser ablation in the synthesis of nanomaterials and the design of functional surfaces. Particular emphasis will be placed on high-precision ablation techniques for nanoparticle generation, thin film fabrication, and biomedical applications. Furthermore, the role of laser parameter control in tailoring surface morphologies will be discussed, highlighting new opportunities in energy storage systems and sensor technologies. Beginning with the fundamental principles of laser-material interaction, the presentation will provide insights into recent research advances and outline future directions for laser ablation in nanotechnology. [brackets].

[1] Abdalameer, N.K., Majeed, N.F., Buraihi, A.K. et al. Optical nanoparticle synthesis: a comprehensive laser ablation review. *J Opt* (2024). <https://doi.org/10.1007/s12596-024-02299-7>

[2] Myungjoon Kim, Saho Osone, Taesung Kim, Hidenori Higashi, Takafumi Seto, Synthesis of Nanoparticles by Laser Ablation: A Review, *KONA Powder and Particle Journal*, 2017, Volume 34, Pages 80-90. <https://doi.org/10.14356/kona.2017009>.

[3] Freeland, B., McCann, R., Akkoyunlu, B., Tiefenthaler, M., Dabros, M., Juillerat, M., Rochfort, K. D., Foley, G., & Brabazon, D. (2025). Digitized Optimization of Nanoparticle Synthesis via Laser Ablation: An Industry 4.0 Multivariate Approach for Enhanced Production. *Processes*, 13(2), 388. <https://doi.org/10.3390/pr13020388>