Contribution ID: **137** Type: **Plakat // Poster**

Pulsed Laser Irradiation – Powerful Method for Composite Particles Synthesis

Monday, 8 September 2025 19:00 (20 minutes)

Laser-based colloid synthesis has emerged as a powerful and versatile technique in nanoscience, offering a clean, surfactant-free route to the production of functional nanomaterials [1,2]. This approach is gaining increasing attention due to its wide application in energy, catalysis, photonics, and biomedicine. In particular, composite nanoparticles—comprising combinations of metals and metal oxides—generate great interest. Their unique physicochemical properties arise from nanoscale interactions and can be fine-tuned by controlling parameters such as composition, morphology, and structural architecture.
Our research focused on the laser fabrication of metal/metal oxides composite particles under varying conditions of laser fluence, irradiation time, precursor material, and solvent environment. We investigated the mechanisms underlying their formation, the interplay between processing parameters and particle structure/composition, and how these factors affected key properties. The electrocatalytic and antibacterial properties of the obtained composites were investigated, highlighting their potential for applications in energy conversion and antimicrobial technologies [3-5].

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Session Classification: Sesja plakatowa

Track Classification: Fizyka plazmy, optyka atomowa, lasery // Plasma physics, atom optics, lasers