iemn
Institut d'Electronique, de Microélectronique et de Nanotechnologie
UMR CNRS 8520

Master or Engineer internship 2024-2025

Proposed by: Kekeli N'KONOU

Phone number :

E-mail: kekeli.n-konou@iemn.fr /kekeli.nkonou@junia.com

Research group: Physics

Title: Shape and composition tuning of silver nanoparticles for plasmonic multicomponent organic solar cells

Context: Organic solar cells (OSCs) represent a rapidly advancing technology in the field of renewable energy due to their potential for low-cost production, flexibility, and lightweight characteristics. Despite these advantages, the efficiency of OSCs is currently limited by several factors, including suboptimal light absorption and insufficient charge generation. A promising strategy to overcome these limitations is the incorporation of plasmonic nanoparticles, which can significantly enhance the light absorption properties of OSCs. Silver (Ag) nanoparticles, in particular, are known for their strong localized surface plasmon resonance properties, which can be tuned by adjusting their shape, size, and core-shell composition. By optimizing the plasmonic properties of Ag nanoparticles, we aim to achieve better spectral overlap with the OSC active layers, thereby boosting their overall performance. This research aims to optimize the shape and composition of silver nanoparticles to enhance the performance of multicomponent OSCs by maximizing their plasmonic resonance effects. The project will focus on integrating these optimized nanoparticles into advanced OSC architectures to improve light absorption, charge generation, and power conversion efficiency (PCE).

Mission: The candidate will use simulation tools like COMSOL or FDTD Lumerical to model the optical properties of silver nanoparticles and their interactions with OSC active layers. The focus will be on optimizing nanoparticle shapes and core-shell compositions to enhance plasmonic effects and improve light absorption. The student will analyze the simulation results to predict enhancements in electric field intensity, charge generation, and PCE in advanced OSC architectures.

Candidate Profile: We are seeking a motivated master's student with a background in nanomaterials, renewable energy technologies, or computational modeling. The ideal candidate should have strong computational modeling skills, familiarity with simulation tools like COMSOL or FDTD Lumerical (preferred but not required), and a keen interest in experimental and simulation-based research to optimize nanoparticle configurations for renewable energy applications.

Gratification: ~600€/month. **Duration:** between 4 and 6 months. **Start:** March 2025.