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Presenting Author, Second/third author (Font-10, Times new roman)

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Abstract (font- 14,Times new roman)

Plasmonics explores the interaction between electromagnetic waves and free electrons in metals, enabling light manipulation at the nanoscale through surface plasmon polaritons (SPPs). This subwavelength control of light allows for enhanced optical fields, making plasmonic structures valuable for applications such as biosensing, surface-enhanced Raman scattering (SERS), photonic circuits, and solar energy harvesting. Key developments include plasmonic nanoparticles, waveguides, and metasurfaces integrated with semiconductors and 2D materials for compact and high-speed devices.

Despite its promise, plasmonics faces challenges such as material losses, limited tunability, and fabrication difficulties. To overcome these, researchers are investigating alternative materials like graphene and aluminum, and active control strategies using electrical or optical modulation. Advances in nanofabrication, computational design, and machine learning are driving innovation in this space.

As plasmonics merges with fields like quantum optics and nonlinear photonics, it holds strong potential for future technologies in sensing, information processing, and integrated photonic systems. (font-12, Times new roman, max- 350 words)

keywords: Heavy metals, Banana peels, Adsorption (font-12, Times new roman, max- 5 keywords)