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Plasmonic Resonances and their Applications

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Plasmonic is the interaction of electromagnetic waves with the conduction electron of metal nanoparticle. Metallic nanoparticles support surface plasmon resonances that can be tuned in the desired range of electromagnetic spectrum. The tunability in plasmonic resonances highly depends on the morphology of chosen metallic particles. The motive of this most emerging branch of nanophotonics is to study and tune the surface plasmon resonances in different regimes of the electromagnetic spectrum that cover a broader range of applications. The various possibilities related to the size and shape of metal nanoparticles are analyzed to understand the physics of scattering, absorption, extinction, and surface plasmon resonances under the influence of the organic and inorganic surrounding environment that finds a variety of applications. To explore the plasmonic signature of metallic nanoparticles, a semianalytical as well as numerical approach has been used. In the semianalytical approach, the electrostatic approximation is used in which the Laplace equation has been solved to explain the electromagnetics of metal nanoparticles having different

sizes and shapes. There are several numerical approaches like discrete dipole approximation (DDA), finite difference time domain (FDTD), COMSOL Multiphysics and boundary element method (BEM) have been used to explain the optics of complex metal nanostructures. In this study, the boundary element method is used to explain the surface plasmon resonances and electromagnetic field profile of metal nanoparticles.

Speaker Biography

Nilesh Kumar Pathak has completed his PhD from Indian Institute of Technology Delhi, India and postdoctoral studies from Science & Engineering Research Board (SERB)/University of Delhi, India. He was exchange fellow at EPFL Switzerland. He was Visiting Research Fellow in National Taiwan University (NTU) Taiwan. He is Assistant Professor in Department of Physics, Maharaja Agrasen College, University of Delhi since 2018. He is working in Computational plasmonics field to explain the electromagnetics of metallic nanogeometries. He has published more than 30 Research papers, 5 Book chapters 7 conference proceedings in reputed journals and has been serving as an editorial board member and reviewers of reputed journals like ACS Photonics, Scientific Report, Plasmonics, Nanoscale etc.

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