

# Ultrafast Nonlinear Optical Studies on Plasmonic Nanoparticles Embedded in Different Glass Matrix for Various Photonic Applications



**Mr. Promod Kumar** received his M.Tech. degree in Nanoscience and Technology (NST) in 2010 from Guru Gobind Singh Indraprastha University, Kashmere Gate, New Delhi, India. He obtained his Ph.D. degree in Plasmonics from National Institute of Technology, Hazratbal, Srinagar (J&K), India in 2015. He has received best oral presentation award in the National/International Conferences during his PhD programme as well as Post-doctoral research period. Promod Kumar is also awarded the certificate of Merit in the National Seminar on Recent Advances On Luminescent Materials (RALM-2015) organized by the department of Chemistry, Annamalie University, Annamalaienagar- 608 002, India during January 23-24, 2015. He also received distinguished researcher award in plasmonics organized by the

international research leadership award sponsored by the international research councils (Rula Award) in 2020 during his post doc career. He has published 35 research articles in international journal of repute and presented more than 40 articles in National as well as International conference.

Presently he has been working as a post-doctoral research fellow under Prof. H.C.Swart and Prof. WD Roos, department of Physics, University of the Free State, Bloemfontein-9300, Republic of South Africa since February 2016. He has more than 5 year's Post-doctoral research experience from University of the Free State, Bloemfontein, South Africa. During the period of his post doc, He worked on ultrafast nonlinear optical studies on plasmonic nanoparticles embedded in different glass matrix for various photonic applications. These prepared materials have been found to be beneficial for eyewear protection and other sensitive instruments from laser induced damages. The quality of his research work is reflected in an article in Applied Materials Today, 15 (2019) 323–334, which has an impact factor of 8.35 and IOP Nanotechnology (DOI: [10.1088/1361-6528/abfee6](https://doi.org/10.1088/1361-6528/abfee6)).

At the present, he is working on the ultrafast laser fabrication for effective platforms of metal/semiconductor for Surface enhanced Raman scattering (SERS) studies and in particular the detection of explosive molecules at ultra-low concentrations, pump-probe spectroscopy and degenerate four wave mixing etc. He has many hours of hands-on experience in X-ray Photoelectron Spectroscopy (5 years' experience), analyzing XPS data using different fitting

techniques. He is also experimenting with software extracting morphology on the nano scale using the inelastic background.

His research interest includes plasmonic metamaterials, conducting-semiconducting thin films, heterostructures, Plasmonic based hybrid nanostructures for SERS applications, Plasmonic Photocatalysts for environmental remediation, Glass doped with Noble metal nanoclusters for Nonlinear optical devices, Graphene based hybrid nanostructures for solar cell applications, sensors, super-capacitor, oxides nanomaterial's, DMS and magnetic nanostructures, structural and optical properties of hybrid materials for superior photovoltaic applications.