**Green Synthesis and Applications of Ruthenium Nano-systems**

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**Abstract:**

Since the dawn of heavy metal organometallic chemistry, Ruthenium based complexes have been used for catalysis and biological assays, owing to its affordability and acceptable efficiency as compared to other heavy metal systems like Rh, Ir, Pd etc. However, to enhance the catalytic and biological activity of Ruthenium based systems they were further converted to nanostructures like RuO2, Ru2P, and metallic Ru NPs, so to enhance their surface activity and reusability. Literatures available are abundant with synthesis of Ag and Au NPs, but that is comparatively much facile as compared to synthesis of Ru and RuO2 NPs. A bigger part of this literature focused on synthesis of Ag and Au NPs using plant extracts to incorporate green chemistry, biological and catalytic efficiency in the synthesized nano-systems with and increased yields and applicability. This encouraged inorganic Nano chemists to develop Ru nano-systems using bio extracts in late 2003 when it was first patented. Since then such systems with particle size varying from 10-30 nm, have been widely used initially for antibacterial and anticancer activity and later for anticancer, antifungal, anticancer and advanced synthetic or degradation catalysis activity within last 10 years. Our group has reviewed this significant growth of Ru based green nanochemistry and postulated tentative mechanisms for such application. The initiation of this field also helped our group to develop a novel concept of Nanoparticle-Plant group correlation plot the correlated plant extract based nano-systems to their biological index on the basis of plant evolutionary index. These systems have guided way for clubbing heavy metal based catalysis with green chemistry is the best possible way hence guiding the upcoming scientists to unravel secrets of this field.

**Biography of presenting author**

Pranshu Kumar Gupta, after being M.Sc. and B.Sc.(Honors) Gold medalist, is currently pursuing Ph.D. in Chemistry as Junior Research Fellow, under supervision of Professor Kalluri V.S. Ranganath, at Department of Chemistry (CAS), ISc, BHU, India. He has worked as a IASc(2018), JNCASR(2019) and BHU(2020) Summer Research Fellow at IISc Bangalore, IISER TVM, ISc BHU, with Prof. Mrinmoy De, Bhatnagar Awdee. Professor K.G. Thomas, Disting. Prof. Lallan Mishra respectively, and published in national and international journals. His research spans over computational nano-chemistry, lattice induced chiral inversion and metal nanoparticle/carbon-dot synthesis; bioactivity; asymmetric catalysis, confinement-controlled photochemistry, Gemini surfactant/gelators stabilized nano-catalyst.

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