

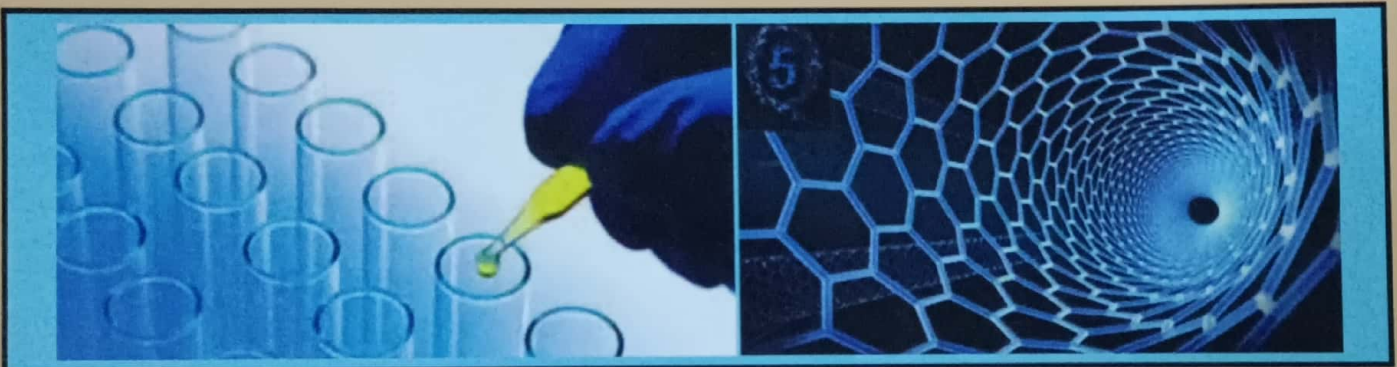
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On

RECENT TRENDS IN SYNTHESIS AND APPLICATIONS OF NANOMATERIALS



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Metal and Metal Oxide Nanoparticles and Immobilization of Cells and Enzymes for Life Sciences Applications

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Abstract:

The ZnO nanomaterials can be synthesized by different routes and can be easily modified to acquire different morphologies like flower, sphere, rod etc. the changing surface area can be an efficient way to study biological activity. Similarly TiO₂ is promising material and can be structured into tubular morphology by simple electrochemical Anodization method. Immobilization method is inexpensive, and easy to prepare that can yield stable matrix processing the maximum retention of the biological activity of the Immobilized enzyme. It is most advantageous method being rapid and simple. Its potential contribution to knowledge in the field of social relevance or national importance.

Introduction:

ZnO and TiO₂ nanoparticles has attracted more attention for its promising applications in photocatalysts, sensors, biomedicine etc. TiO₂, ZnO nanoparticles has been synthesized into various shapes including nanoparticles, nanoporous materials, nanowires, nanorodes nanotubes etc. The ZnO nanomaterials can be synthesized by different routes and can be easily modified to acquire different morphologies like flower, sphere, rod etc. the changing surface area can be an efficient way to study biological activity. Similarly TiO₂ is promising material and can be structured into tubular morphology by simple electrochemical Anodization method.

The effect of different size and shape can be studied on biological activities like immobilization of cells and enzymes (proteins, fatty acids, vitamins etc.) and other applications in life sciences. Presently immobilized proteins /enzymes are used routinely in the medical field, such as in the diagnosis and treatment of various diseases. Encapsulated enzymes are also used in bioreactors for removal of waste metabolites and correction of inborn metabolic deficiency.

In recent years the use of nanoparticles has expanded in the field of aquatic biology such as fisheries and aquaculture industries (Handy, 2012). These include considerations for new fish feeds, food packing, life of fresh fish food, material for aquaculture engineering and fishing vessels, water quality control, technology and delivery of fish medicines.

To synthesize ZnO / TiO₂ and metal nanoparticles using simple and inexpensive chemical route synthesis viz, solvothermal, hydrothermal synthesis methods can be used for life science applications.