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Mini Review

Colloids: Incredible Particles with Plausible Biomedical and Agro-Environmental Applications

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Scientific and technological advancements of the contemporary world are bewildering. Coping up with the growing needs and changing trends, exploration of new materials for various applications seem to be inevitable. With the promising future in both medicine and environment; nanoparticles, composites and related surrogates are put to wide use in research arena [1]. Right from the deployment of various biodegradable materials in molecular and clinical medicine to providing efficient adsorbents in environmental detoxification processes, Nano-world is defining the course of the future [2].

The concept of nano-molecular machines in the recent years has revolutionized the way we deliver drugs to cells and tissues [3]. Nanomaterials are also used as synthetic replacements for biological tissues [4]. The diagnostics and array technologies have been influenced by nano-interventions for the betterment of clinical landscape [5]. Nanomaterials are used in point-of-care technologies for molecular diagnostics with unbelievable levels of precision [6]. The fluorescent biological labels designed out of semiconductor colloidal nanocrystals have exceptional photo-physical properties and versatile medical applications [7,8]. In the cardiac repair, diligently engineered nanoparticles are fabricated on biological macromolecular composites and used in tissue engineering [9]. With the unique intrinsic properties vested on gold nanoparticles, they are put to wide biomedical applications [10-12]. However, Zinc oxide and silver nanoparticles are also equally explored in this regard [13,14]. Nanomaterials can also be used in precision farming and sustainable agriculture [15]. Despite the wide applications of various nanoparticles in biomedical and environmental applications, toxicity is a major subject matter for much debate [1,15,16]. There is only handful of toxicological reports on nanoparticles on humans and environment. Dearth of information pertaining to toxicity of nanomaterials leaves considerable room for further assessments with every breakthrough.

With the advent of graphene in nanotechnology, the paradigm has shifted with incredible possibilities and efficient processes [17]. Metaphorically regarded as the 'Cinderella of Nanotechnology', Graphene holds promise for next generation biomedical and agro-environmental technologies [18-20]. Environmental detoxification by nanomaterials is a growing field with plausible opportunities [21]. The scope of this field is to remediate pollutants based on technologies comprising nanoparticles, nanocomposites and other colloids [22,23]. Further, there are possibilities of widening the horizons by developing fusion technologies built on supramolecular chemistry, biomaterials and semiconductors [24,25].

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