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## Recent Application of Synthetic Polymers as a Nano Materials and Human Being, a Review Study



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### ABSTRACT

In this review we are studying importance of synthetic polymers as nano materials. Nano technology giving an excellent revolution at present time and most favorable for nano materials which are made by synthetic polymers that are widely used for the design accordingly drug delivery system; synthetic polymers are used as a tailoring formulation and therapeutic applications and developments. Our passing time spent with very critical conditions because we are suffering from unidentified and unknown contamination problems, although very well knowing disease about the covid-19 and duration of the periods synthetic polymers play a model role in each and every field, so many uncountable fields where polymers are used. Biodegradable polymeric nano-structures have indicated extraordinary guarantee in various remedial applications, for example, analysis, imaging, sedate delivery, beautifying agents, organ embeds and tissue designing. This review focused on some biodegradable polymer materials such as natural polymeric nano material, chemically synthesized polymer materials, and biosynthesized polymeric materials, and points out the advantages and the direction of research on degradable polymeric materials.



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## INTRODUCTION

In recent time nano technology play excellent key role in daily life or human nature and when we compare to past time and present time, we will get a lot of different variables from fast decade in any field. Past life is very critical in especially medical field, travelling field because that was the time no enough source was available. Modern time is very easier because each and every field covering by the science and technology. Duration covid-19 periods new vaccines are discovered by using science and in this process prepared, synthetic peptide vaccines, DNA vaccines, and nano vaccines [1,2,3,4] COVAXIN shield COVID-19 vaccine Recently discovered by Bharat Biotech is developed in collaboration with the Indian Council of Medical Research (ICMR) - National Institute of Virology. With the development of modern design concepts, immune system enhancers or drug delivery systems are used to improve immunogenicity, minimize toxicity, and enhance effectiveness [5] Nano medicine is a rapidly developing area of biomedical research that uses devices of nanoscale size to address urgent needs for effectively detecting diseases and improving drug and gene delivery. Such Nano Material (NM)-based delivery vehicles have the ability to improve drug pharmacy kinetics, bio distribution, cell- or tissue - specific targeting, and drug exposure kinetics, resulting in enhanced efficacy and improved tolerability [6-8].

Poly nano particle more used in environmental and agriculture areas and used in drug delivery, imaging, biosensor. PNP having small size so there for they are easily permissible by the nano size capillary or other permissible carrier materials. More application of PNP is drug safety system, releasing of drug and controlling of drug system in human body. Nano polymer having extra mechanical strength, optical and thermal properties, and conductivity, they are used in water treatment applications, sensor activity [9–15].

### **Application of nano materials**

#### **Application in medical science**

Nano composite materials formed by the polymers which are more useful as an antibacterial because they are most probability abundance present in the nature and most antibacterial agents are chemically modified natural compounds [16]. It is well known that few nano particles are mostly used for antibiotics purpose. Nano particles serve as better antibacterial agents, because

they have a high surface area to volume ratio, and unique mechanical, electro-optical, chemical, magnetic, electrical, magneto-optical, and optical properties. Nano particles have been demonstrated as effective in the environment against bacteria. Bio polymers also used in covering of wounds duration of accident or wounds made inside the body because contamination of wound is increase due to highly infection and second is you are not properly dressing your body wounds it means you are un feet the life. As drug delivery systems, nanoparticle can absorb drugs or vaccines on to their exterior surfaces, or entrap drugs or vaccines into their interior structures. Presently, nano particles are widely used in many areas, including the delivery of polypeptides [17] proteins, [18] vaccines [19], nucleic acids,[20] and genes [21] Over the years, nano particle-based drug delivery systems have exhibited huge potential in medical, biological, and pharmaceutical applications [22].

### **Application in agriculture field**

Synthetic NM have very important application in agriculture fields because now these days a lot of heavy metals and unwanted elements present in the agriculture land and these elements made unused the soil, due to highly alkaline or highly acidic, there for prevention of the unwanted soil, synthetic natural polymers are playing a key role. Polymer gives an important role as an absorbent form because mostly part of land is converting in desert, but nano polymeric material helps to prevent from the desertification because polymer increase the water hold capacity, increasing water use efficiency, enhancing soil permeability and infiltration rates, reducing irrigation frequency, reducing compaction tendency, increasing plant performance (especially in structure -less soils in areas subject to drought). An availability of water in the soil growing the vegetation and liquid water containing different type of minerals which are very useful for plants. Polymers materials having water absorbed nature, therefore maintaining water level in the soil and swell to many times and maintain original size of the land. Polymers are cross-linked to each other and having specific groups which are maintain water hold capacity [23-24]. Polyacrylic acids hydrolysis by the starch– acrylonitrile copolymers and starch–acrylic acid graft copolymers, which are more useful and obtained product, is used as a commercial product for improvement water absorbent capacity for soil. But synthetic polymers are as compare to natural polymers or Biodegradable polymers are very important because synthetic polymers easily not degraded and make fully pollution in environment [25]. The half-life is in general in the range 5 -

7 years, and they degrade into ammonium, carbon dioxide and water. SAP hydrogels potentially influence soil permeability, density, structure, texture, evaporation, and infiltration rates of water through the soils. Particularly, the hydro gels reduce irrigation frequency and compaction tendency, stop erosion and water runoff, and increase the soil aeration and microbial activity [26].

### **Application in textile industries**

It is well known that the natural polymers are used from the ancestor periods. At present time a wide range of consumer applications of natural fibers, such as juts, cotton, silk, and wool, along with synthetic fibers, polyester and nylon, and natural rubber obtained from the plant and after vulcanization it is useful for us. Synthetic polymers are more useful as compare to natural polymers and industrial applications, application of wide range in the different areas like as carpets, tents, tires, ropes, belts, cleaning cloths, and medical devices. Innovation of nano technology make the good possibility of natural and synthetic fibers, through the nano technology natural polymer and synthetic polymers are more useful in different fields [27]. Synthetic nano materials are mostly used in textile industries like as many natural and synthetic clothes are coloring by the synthetic dyes and color. Recently coating technologies, very important by this technology many organic, inorganic compounds are directly utilized. Many examples such as polyacetylene, polypyrrole, polyaniline [28] Au [29] Ag [30] Pd [31] Cu [32] Si [33] CuO [34] ZnO [35] carbon nanotube (CNT) [36-37] TiO<sub>2</sub> [38,39] chitosan [40] MXenes [41] and graphene oxide (GO) [42] nanoparticles. Textiles modified with these nanomaterials have potential applications in wound healing [43-44] air purification [45], drug delivery [44], cosmetics, renewable energy generation and electronic applications such as fabrication of on-body diodes, transistors and circuitry. Synthetic polymers are exhibiting more utility in space wearing clothing which are made by the heat resistant polymers.

### **Application in automotive field**

Nano composites represent a new class of materials that exhibit excellent thermal and mechanical properties. Due to the high performance are suitable for use in aerospace, automobile, chemical and transport industry [46]. The first industrial production of nano composites in the automotive industry occurred in 1991 with the production of timing

belt covers as part of the engine for Toyota Camry cars [47].

Most research and development based on nanotechnology is being implemented in the automotive sector. Nanotechnology is applied to parts of the body, chassis and tires, automotive interiors, electrical and electronics, IC engines and drive systems [48]. In recent years, remarkable progress has been made in various industries which motivated researchers to work on new structural materials for better performance in engineering applications. Nanocomposites represent a new class of materials that has excellent thermal and mechanical properties. The application of nano composites for development of automotive components is reflected in the improvement of the production rate, environmental and thermal stability, and the reduction in weight in the automotive industry, less wear parts, and indirectly to reduce CO<sub>2</sub> emissions and environmental pollution. This research paper presents a review of the application of nanocomposites (metal, ceramic and polymeric) in the automotive industry [49].

Aluminum hybrid nano composite applied in IC engine cylinder liner (NL) and reported to performance by Tiruvenkadam N. et al. and by this study they are change steel made piston and observed what result obtained to replace steel piston. Found that result obtained with high. Applying NL is reduced emissions of CO, HC and smoke quantity output, but the increased NO<sub>x</sub> emission [50]. Mostly nano composites made by polymers, most commonly used elastomers, thermoplastics and thermoset [51].

## CONCLUSION

Present scenario showing that all field related to construction, medical field and space field, technical areas and many useful areas which are covering by the nano polymers, because polymer made our life easily. it is very interested field that application of polymer science has started from long back time and at present time it is fascinates thousands of scientists in all world because of its vast application in various fields, e.g. Natural polymer, Plastics, rubbers, fibers, adhesives, paints, sealants, etc. Products made from the combination of nanotechnology and polymer science are of great importance because the use of these two has brought about a revolutionary change. Polymer can provide materials for many high-tech applications, e.g., flexible electronics, mobile phones, tablets, computers, watches, sport accessories, electric scooters, protective coatings, electrolytic cell membranes, elastomers, specific items in

automotive industries, aerospace and aeronautics, and microelectronics and cars, etc. Polymers can give us the next generation battery which can be used for many applications. There are many scope of research in polymer science, durable making them imperishable. An exciting future is waiting for all of us in polymer science. It is a privilege for us to write this review for all the researcher and scientist and we hope that the readers will find in this article new, because many latest information input in the review and we want to acknowledging about excellent information from starting of same work to end of this work.

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