Polymer Sciences
ISSN: 2471-9935

Open access Opinion

Major Developments in Polymer Sciences

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INTRODUCTION

The urgent necessity variation in polymer structures and functions has resulted from science and technology's quick progress, and polymer chemistry is constantly pursuing new polymerizations and new polymer structures. COVID-19 is without a doubt one of the most deadly diseases that humanity has ever encountered. Viral transmission occurs quickly and occurs *via* contaminated surfaces, respiratory droplets, and body fluids. It was discovered that the best approaches to keep safe during the current pandemic, in the absence of an effective vaccine or particular treatment, are to use personal protective equipment, avoid cross-contamination of hands, and maintain social distance. In this field, COVID-19 has been probed, sensed, and treated using polymers, nanotechnology, and additive manufacturing, or 3D printing technology. The COVID-19 epidemic had unquestionable roles in all of the aforementioned sectors, and their contributions are discussed below.

DESCRIPTION

The value and significance of polymeric materials in human existence are well known, and we use them on a daily basis. Polymers are widely utilised because of their formability, affordability, greater chemical resistance than metals, diversity, biocompatibility, and in certain circumstances, biodegradability. It was stated that the greatest defence against this virus is the use of PPEs, which lower the risk of infection since they serve as a barrier against germs and viruses. As can be seen in the image, medical personnel require a variety of tools, including the masks, gloves, and goggles that will be covered in the next section from a structural and kind perspective. Polymeric polymers, such as poly (ethylene terephthalate) (PET), Polypropylene (PP), Polyethylene (PE) latex, acrylonitrile butadiene rubber (also known as nitrile), poly (vinyl chloride), and others, are the main constituent of this equipment. Additionally, the use of polymers in coatings and sensors will be covered. One method society will take to limit overall consumption of polymers and lessen their negative effects on the environment is mechanical recycling. However, even for polymers with identical chemical structures, the difficulty in mechanical recycling from mixed plastics is incompatibility, which can result in phase separation and inhomogeneous materials. Di block copolymers or *in situ* interfacial reactions have been the traditional methods for increasing polymer compatibility. The presence of functional groups in the structures of polymeric materials is a significant characteristic that can result in antiviral action. The COVID-19 spikes, for instance, have a significant electrostatic contact with extremely positively charged polylysine molecules, which prevents the reproduction of the spikes.

Multicomponent reactions (MCRs), which can produce a single product from three or more starting materials in a single pot, have a number of benefits, including straightforward operation, mild conditions, high efficiency, environmental benefits, and, most significantly, a wide variety of product structures. Numerous MCRs, such as the Mannich reaction, Passerini reaction, Ugi reaction, Biginelli reaction, Hantzsch reaction, Kabachnik-Fields reaction, Debus-Radziszewski reaction, and many others, have been reported since the Strecker synthesis of amino acids from a three-component reaction of aldehydes, hydrogen cyanide, and amines in 1850. MCRs, which have uses in organic synthesis, combinational chemistry, and the pharmaceutical industry, have steadily grown into potent techniques for quickly building libraries of molecules with structural variety.

CONCLUSION

The use and significance of polymer science and soft matter in technology will only increase as these fields continue to make strides. It has been shown that multicomponent polymerizations and multicomponent reactions involving polymer synthesis are very effective tools for creating functional polymers with a variety of structures and cutting-edge functionalities, and they have developed into a thriving subfield of polymer chemistry. This special issue is expected to spur material scientists and polymer chemists on in their future work and hasten the creation of useful polymer materials and synthetic methodologies.

Received:	30-August-2022	**Manuscript No:**	IPPS-22-14630
Editor assigned:	01-September-2022	**PreQC No:**	IPPS-22-14630 (PQ)
Reviewed:	15-September-2022	**QC No:**	IPPS-22-14630
Revised:	20-September-2022	**Manuscript No:**	IPPS-22-14630 (R)
Published:	27-september-2022	**DOI:**	10.36648/2471-9935.7.5.25

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Citation Julius M (2022) Major Developments in Polymer Sciences. J Polymer Sci. 7:25.