Editorial Corner

Sustainable Natural Fibers for Environmental-Friendly Materials

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Due to its significant advantages in substituting synthetic and hazardous materials, the current global context has a significant impact on the creation of new environmental-friendly materials. In the discipline of engineering, the use of environmentally friendly renewable materials would promote sustainability by reducing waste, landfills, and harmful emissions, resulting in a greener and cleaner environment. Natural fiber is an environmentally friendly renewable material that has gained researchers' interest due to its unique qualities, such as low density, low cost, easy availability, biodegradability, and ease of processing. Natural fibers have become more popular as reinforcement materials in composites for a variety of applications, including aerospace, automotive, and household products. Other popular uses of natural fiber composites include furniture, upholstery, railway coach interior panels, horticultural supplies, packaging goods, structures, and sports instruments. Natural fiber-based composites are employed in light weight-bearing applications and lightweight structures due to several constraints, such as compatibility, hydrophilic nature of the fiber, and considerable mechanical strength. Surface and chemical treatment techniques can be used to overcome limitations such as biocompatibility and hydrophilic nature. Natural fibers come from a variety of sources, including plants, animals, and minerals. Several factors influence the qualities of these fibers, including their geographical location, origin, extraction method, and processing. Natural fibers extracted from plants and trees mainly consist of cellulose, hemicellulose, lignin, pectin, wax, etc. Animal fibers are divided into two categories based on their origin hair and secretions [1]–[14].

The weight % of chemical constituents, such as cellulose, hemicellulose, lignin, and wax are estimated by chemical analysis. There are various methods to analyze the chemical constituents [15]. An optical microscope or a scanning electron microscope is used to measure the diameter of natural fibers (SEM). SEM and AFM can be used to determine the roughness of natural fibers (Atomic force microscope). Natural fibers' crystallographic structure, crystalline index, and crystal size are determined using the X-ray diffraction method. The thermogravimetric analyzer is used to test the thermal performance of natural fibers. The chemical composition and functional groups contained in natural fiber are identified using Fourier transform infrared (FTIR) spectroscopy.

At last, natural fibers are unique qualities and availability as renewable and sustainable resources, natural fibers have numerous benefits over synthetic fibers. Plant cultivation minimizes greenhouse gas emissions and protects the environment from global warming. After being disposed of, natural fiber-based products are easily biodegradable. They do not damage the environment by filling landmasses and water bodies, causing serious health risks [16]–[20].

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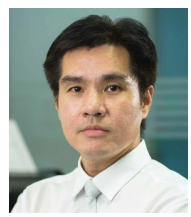

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