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Natural fibers and composite materials reinforced with natural fibers: the motivation for their research and development

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One of the research topics of articles that are submitted continuously to the subsections of "Composites, Polymers and Fibers" is natural fibers and composite materials reinforced with these fibers. The motivation for the use of these materials is justified with several arguments, among which are emphasized: eco-friendly materials, relatively low cost and weight, social benefits, and good mechanical properties, among others.

The first of the arguments, eco-friendly materials, is based on multiple factors as the biodegradable nature, fibers derived from renewable sources, its carbon footprint, among others [1][2]. This reason is widely used for natural matrix reinforced with natural fibers because completely biodegradable composites are obtained [3][4]. The low-cost argument comes from the comparison with high-performance fibers [5], and in many cases, it is associated with the fact that the fibers are obtained as waste from other processes [6]. Regarding weight, it is mainly based on the comparison of densities with fibers such as glass, basalt, and boron [7]. Fibers like carbon, aramid, and polyethylene do not present large differences with natural fibers [8].

Social benefits are associated with the fact that many of the regions that produce these fibers are in areas with fragile economic conditions or degraded environment [9]. In some situations, natural fibers may result from the waste of some crops. In these cases, the promotion of its use is justified by the generation of additional economic benefits for the communities. In other situations, the fibers may correspond to native species that could produce environmental benefits compared to foreign cultivated species.

Often the terms "mechanical properties" are inadequately used. Sometimes, the broad spectrum of properties and technological characteristics covered by the field of the mechanical behavior is not considered. It should be noted that the terms "mechanical properties" are not wholly covered by the results of a tensile test. Several publications showed results of some natural fibers with good performances in characteristics such as ultimate tensile strength, modulus of elasticity, and impact energy absorption [1][10]. Some researchers found natural fiber/resin combinations with results comparable to fiberglass reinforced composite. In the same way that several synthetic fibers, mechanical properties of natural fibers become remarkable when specific properties are analyzed, i.e., properties per unit weight [11].

There are other motivations for research and development of natural fibers and their derivatives composites in addition to those previously mentioned. Some examples are the ability to absorb contaminants in certain fluids [12][13][14], low abrasion [1], and thermal and acoustic insulation [10].

These materials have some weaknesses as the degradation of properties because of humidity, temperature, or problems in the fiber/matrix interface. It is no surprise that part of the publications on these materials is intended to improve these characteristics [8].

The growing consumption of natural fibers reinforced composites can be observed in several areas. Different authors highlight its use in the car industry [5], building interior construction, sports accessories, and office supplies, among others [15]. It is expected that new areas of application of these materials can be found. The research and development may follow the challenges that high-performance composites are currently experiencing. This change may include the production of natural fibers reinforced composites employing additive manufacture [16].

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In this new edition of the Journal Matéria, the members of the editorial board are pleased to have two outstanding contributions to the area of materials science. On the one hand, articles from three subsections of the journal are published: Metals, Biomaterials and Compounds, Fibers and Polymers. On the other hand, we have the contributions of works presented in two important scientific events that were held in Brazil during 2018. They are the International Symposium on Natural Polymers and Composites (ISNAPOL) and the Congresso Latino-Americano de Órgãos Artificiais e Biomateriais (COLAOB).

The invitation is open to readers to explore the different articles and find topics that are of interest. The sub-section of Composites, Polymers and, Fibers invite to read articles presented both in this subsection and those corresponding to ISNAPOL/COLAOB. Various interesting articles of natural fibers and natural fibers reinforced composites were published.

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