Mitigation of environmental pollution using cellulose-based natural rubber latex composites

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In the modern rubber industry, the major problem is the use of petroleum-derived chemical reinforcements that exploit conventional sources of energy. In this review article, we have discussed the importance of some cellulose-based reinforcements as an alternative to harmful chemicals in rubber composites. The employment of natural cellulosic fillers not only improves the biodegradability of rubber latex but also enhances its mechanical and thermal properties. Such reinforced rubber composites can be used effectively in various sectors, i.e. food packaging, footwear, water purification and sensors. In the last, the current outlook and future perspectives of smart rubber composites in commercial areas are also discussed.

Keywords: Biodegradability, bio-fillers, mechanical properties, rubber latex.

mercial usage due to its soft and sticky nature, altered chemical properties, and low mechanical strength. After the incorporation of fillers, the properties of resulting rubber composites are better than those of virgin latex[10]. Both synthetic and natural materials can be employed as reinforcements in neat rubber matrices. Some synthetic fillers include materials like carbon black, calcium carbonate, clay, glass fibre, etc.[11,12]. The usage of synthetic fibres in composite materials led to many health risks and environmental hazards[13]. Whereas, natural fibres have several appealing characteristics, including low cost, high mechanical strength, ease of processing and easy accessibility from the environment. Cellulose is the most prevalent natural fibre which carries all the mentioned unique properties[14–16]. In the past decade, cellulose has been successfully adopted as a natural reinforcing fibre in rubber technology[17–19]. Oboh *et al.*[20] examined the impact of several lignocellulose biomass from bamboo culm, coconut husk and