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2023 is a remarkable year for Green Chemistry and Green Materials

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I take advantage of this editorial at the beginning of the year to wish a very happy New Year 2023 to our readers and to our journal Green Materials. We hope that this New Year will be marked by the development of technological responses adapted to environmental and societal challenges on a global scale. Our modern societies indeed base many hopes on the technological answers to these essential questions. Chemistry is a science that feeds an industry upstream of all the others, and therefore very much in demand in all technological developments. Green Chemistry can provide much-awaited answers to these sustainability issues.

Moreover, this year 2023 is particularly remarkable because we are celebrating several anniversaries around Green Chemistry. In particular, we celebrate the 25th anniversary of the 12 principles of Green Chemistry described in the groundbreaking book "Green Chemistry: Theory and Practice" co-authored by Paul Anastas and John C. Warner and published in 1998. However, the phrase "Green Chemistry" was officially coined in 1991 by EPA Office of Pollution and Toxins Prevention staff that sowed the seeds for productive collaboration between government, industry, and academia. Indeed, the Pollution Prevention Act of 1990 marked a regulatory policy shift from pollution control to pollution prevention as the most effective strategy for these environmental problems. Hence, in the early 1990s, the Chemistry Council of the European Community published articles on the subject, including the influential book "Chemistry for a Clean World".

Moreover, 2023 is also remarkable since it is the 10th anniversary of Green Materials journal. The first issue was released in March 2013, with an editorial by Michael Shaver who served as the first editor-in-chief.

With these aspects in mind, this issue of Green Materials follows the principles of Green Chemistry, particularly with the use of renewable resources, the substitution of harmful chemicals, and an environmentally driven approach.

The underlying idea of the study reported in first paper¹ was conceived after numerous reports of marine oil spill occurrences and the often-inefficient mitigation efforts. Physical and chemical efforts are commonly made but prove to be unsustainable in the long run. Bioremediation efforts are more environmentally friendly; however, the efficiency needs to be tweaked. Hence, maintaining a high biomass of oil-degrading bacteria has proved challenging. Here, a carrier that enables simultaneous bacterial immobilization and oil absorption is proposed as a solution. Porous cellulose triacetate beads (PCTBs) derived from cellulose triacetate powder were obtained through the acetylation of kapok fibres. This study revealed, that PCTBs with oil-degrading bacteria are potentially able to absorb and degrade oil simultaneously, thus highlighting the novelty of a working alternative for sustainable oil spill mitigation.

The second paper² studied the replacement of petroleum-based polymers by biobased polymers in air cushions in transport packaging brings in order to reduce environmental damage due to discarded packaging. Hence, the authors proposed to combine fatty-based dimer acid polyamide films with montmorillonite (MMT). The layer structure of MMT and the heterogeneous nucleation effect augment the crystal content of the g-crystal phase. The oxygen permeability and thermal stability of the film improve as the MMT content is increased. Hence, the results showed that dimer acid polyamide/MMT film can fully meet the requirements of air cushions for short-term transportation.

The purpose of the work reported in the third paper³ was to obtain the thermal conductivity of a biomaterial based on cornstalk, as well as the hygroscopic properties that demonstrate the possibility of its use in different applications as insulating material. The thermal conductivity obtained at 30°C for the insulating material show that the hydrothermal properties of this material make it suitable as a thermal insulator, having a thermal conductivity value of 0.043 W/(m K) and absorbing less than 9% humidity in environments of up to 85% relative humidity.

In the fourth paper⁴, the authors proposed to use simultaneously eggshells (ES), waste grinding sludge (GS) and chromium (Cr) as reinforcement content in the fabrication of aluminum/magnesium alloy based composites. Thus, ES and GS were used as primary and secondary reinforcement contents. Chromium was further used to prevent the grain growth of the composite material during the solidification process. These hard phases were accountable for improving the mechanical properties of the fabricated composite.

Taken together, the articles in this issue reveal not only the growing attention paid to the use of renewable resources and the substitution of harmful substances, following the trends in society, but also all the interest and promises of this chemistry for the improvement of current materials and the design of new green materials.

¹ DOI : 10.1680/jgrma.21.00064

² DOI : 10.1680/jgrma.22.00027

³ DOI : 10.1680/jgrma.21.00046

⁴ DOI : 10.1680/jgrma.21.00035