

RECYCLING OF RECOVERED PAPER. PAPER INDUSTRY, Dan Gavrilescu and Ioan Bulică, Performantica Publishing House, Iași, 2019, 224 pp.

Paper is one of the most well-known and probably most frequently used bio-based materials. Its importance in our every day life is denoted by its multiple uses, but also by its recyclability. Currently, recovered paper is the main fiber source for the paper industry. Today, papermakers are facing important challenges, such as the continuously decreasing recovered paper quality, the low intake of virgin fibers and the wide range of paper grades that need to be produced to meet market demands. The paper industry is continuously struggling with multiple issues, such as collection, sorting and processing of the recovered paper to obtain high quality products, as well as compliance with continuously environmental regulations.

In the first chapter of the book, the authors deal with the history of paper recycling and statistical data, together with a description of the economic and environmental reasons for this important activity. Data regarding energy consumption and the evolution of the environmental performance of papermaking are presented as arguments.

The second chapter is dedicated to the collection and sorting of paper for recycling. Important aspects, such as the sources of recovered paper and the impact of collection methods on the recovered paper quality are pointed out. The separate collection of paper for recycling is underlined. Recovered paper sorting is an important activity for removal of large contaminants and improving the quality of recovered paper.

In chapter three, the papermaking potential of secondary fiber is brought into focus. Fiber modifications occurring during the life cycle of paper are pointed out as the main reasons for loss of mechanical properties of secondary fibers. The recovery of the papermaking potential is a continuous challenge and the means of achieving the necessary characteristics include fiber refining, fractionation, the use of additives and mixing with virgin fibers.

From repulping to screening and cleaning and further fractionation of recycled paper pulp, chapter four describes the processing of recovered paper pulp, together with the equipment needed. Factors affecting the performance of the involved operations are well described and graphical representations are provided. In this way, a comprehensive view of the overall process is provided. Special subchapters are dedicated to thermo-mechanical treatments and to the processing of board grade papers.

Deinking of recovered paper pulp (chapter five) is of great importance when printing and writing paper grades are intended to be produced. The principles of deinking and the methods to be used for ink removal are presented (flotation deinking, washing deinking and combined deinking). Bleaching of deinked pulp and further processing of recovered paper for white paper and board grades are also discussed.

In the final chapter of the book, the authors focus on the wastes resulting from recovered paper processing. A brief introduction into the matter describes the importance of the subject from multiple points of view. Furthermore, the types of wastes resulting from recovered paper processing are detailed, including ways of valorization or final disposal by incineration.

The book "Recycling of Recovered Paper. Paper Industry" constitutes a useful reference for trainees and professionals in the field of recovered paper processing and papermaking.

Adrian Cătălin Puișel

SURFACES AND INTERFACES IN NATURAL FIBRE REINFORCED COMPOSITES. FUNDAMENTALS, MODIFICATIONS AND CHARACTERIZATION, Nicolas Le Moigne, Belkacem Otazaghine, Stéphane Corn, Hélène Angellier-Coussy, Anne Bergeret, Springer, ISBN 978-3-319-71409-7

Natural fibres and natural fibre composites with their long history for serving mankind are very important in a wide range of applications, due to the large interest in materials derived from sustainable resources that can be processed with lower energy consumption requirements, and recyclable materials, including those from which energy can be recovered.

The present brief introduction presents the main concepts related to interface modifications in natural fibre based composites, taking into consideration the particular micro- and supramolecular structures encountered in plant fibres, modification and functionalization strategies, biocomposites behaviour and properties, and characterization of surfaces and interfaces in natural fibre based composites.

The introductory chapter provides a general overview of biopolymers as building blocks in natural fibers and biocomposites, as well as the latest research and applications of these materials. Bio-based polymers, such as cellulose, hemicelluloses, pectins, lignin and proteins, are introduced along with detailed discussions about the chemical nature, cell wall microstructure and plant cell organization, and finally, the surface and structure properties of natural fibres.

The remaining chapters of the book discuss multiple and multi-scale interfaces in natural fibre based composites, their properties and performance, different pretreatments and functionalization treatments to modify natural fibres and interfacial properties, the interface and interphase modification and characterization.

The book published in SpringerBriefs, as part of the Molecular Science book series (BRIEFSMOLECULAR) and of the Biobased Polymers book subseries (BRIEF SBP), well systematized and containing a large amount of valuable data, represents an excellent guide addressed to students, researchers, the academia and the industry in the sphere of natural fibres.

Bogdan-Marian Tofanica

SUSTAINABLE JUTE-BASED COMPOSITE MATERIALS. MECHANICAL AND THERMOMECHANICAL BEHAVIOUR, Abdul Jabbar, Springer, ISBN 978-3-319-65456-0

Jute is the common name given to the fiber extracted from the stems of plants belonging to the genus *Corchorus*, family Tiliaceae, from which only two species are grown commercially, although around 40 wild species are known. Fibers can be extracted from the bast of woody stems of these plants and be used as reinforcement in natural fiber reinforced polymer composites, with or without surface modification.

The book published as part of the SpringerBriefs in the Applied Sciences and Technology book series (BRIEFSAPPLSCIENCES) presents all the conventional and latest knowledge available on jute, which, collected as a waste from the textile industry, can be used as a cheaper source of natural fibers and can be employed for further surface modification by means of novel environment-friendly methods.

The introductory chapter provides a general overview on the use of natural fibers in the composite industry and briefly describes the industrial interest and research objectives in the use

of natural fibers as reinforcement in polymer composites, while also underlining their advantages in replacing their synthetic counterparts in certain applications. The following chapter, *Literature review*, holds on to the specific objectives of the book, dealing with the classification, structure and chemical composition of plant-based natural fibers, and presenting their specific advantages, compared to their synthetic counterparts. Different chemical, physical, and biological methods for surface modification of natural fibers are discussed in detail.

Chapter Three on *Research Methodology* gives information about the materials used to prepare green jute/epoxy composites. The methods used to prepare nanocellulose and pulverized jute fibers (PJF) from waste jute are discussed. Different novel fiber surface treatment methods are introduced. The chapter further proceeds with the description of different techniques for characterization and testing of fibers, *i.e.*, scanning electron microscopy (SEM), Fourier transform infrared spectroscopy (FTIR), and X-ray diffraction (XRD).

Chapters Four, Five and Six present the analysis of results reported on epoxy composites. The characterization of chemically treated jute fabric and waste jute fibers, preparation and characterization of nanocellulose-coated jute composites and evaluation of woven jute fabric-reinforced epoxy composites have been explored. Possible applications of the prepared composites are proposed, and limitations are defined.

Finally, conclusions are summarized in Chapter Seven. Based on the analysis of the results, the chapter also discusses proposed applications, limitations and recommendations for future work in the case of the three different categories of reinforcement/pulverized micro jute fillers, nanocellulose coated jute fabrics, and novel surface treated jute fabrics.

The field of natural fiber reinforced polymer composites is evolving fast, that is why the present work is an ideal supplementary, well-written, succinct and accessible book for anyone interested in the scientific research on jute-based composites.

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