SpringerBriefs in Molecular Science

Biobased Polymers

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Published under the auspices of EPNOE*_Springerbriefs in Biobased polymers_ covers all aspects of biobased polymer science, from the basis of this field starting from the living species in which they are synthetized (such as genetics, agronomy, plant biology) to the many applications they are used in (such as food, feed, engineering, construction, health, …) through to isolation and characterization, biosynthesis, biodegradation, chemical modifications, physical, chemical, mechanical and structural characterizations or biomimetic applications. All biobased polymers in all application sectors are welcome, either those produced in living species (like polysaccharides, proteins, lignin, …) or those that are rebuilt by chemists as in the case of many bioplastics.

Under the editorship of Patrick Navard and a panel of experts, the series will include contributions from many of the world's most authoritative biobased polymer scientists and professionals. Readers will gain an understanding of how given biobased polymers are made and what they can be used for. They will also be able to widen their knowledge and find new opportunities due to the multidisciplinary contributions.

This series is aimed at advanced undergraduates, academic and industrial researchers and professionals studying or using biobased polymers. Each brief will bear a general introduction enabling any reader to understand its topic.

*_EPNOE The European Polysaccharide Network of Excellence (www.epnoe.eu) is a research and education network connecting academic, research institutions and companies focusing on polysaccharides and polysaccharide-related research and business_.

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Surface Properties of Non-conventional Cellulose Fibres

Springer

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Abbreviations

θ	Scattering angle
λ	Wavelength
ζ-potential	Zeta potential
AMBET	Alkali-assisted microwave plus biological enzymatic technique
BFF	Borassus fruit fibre
CB	Cassava bagasse
CBN	Cassava bagasse nanofibres
CI	Crystallinity index
CMF	Cellulose microfibrils
CNC	Cellulose nanocrystals
CNF	Cellulose nanofibrils
d	Diameter
DLVO	Derjaguin–Landau–Verwey–Overbeek theory
DP	Degree of polymerization
FTIR	Fourier-transform infrared spectroscopy
L	Length
LCA	Life cycle assessment
m_1	Mass of sample after exposure to 65% RH
MAPP	Maleated polypropylene
MCC	Microcrystalline cellulose
MG	Giant Miscanthus
m_o	Mass of absolute dry material
M_s	Moisture sorption
PALF	Pineapple leaf fibre
PDI	Polydispersity index
PHF	Pea hull fibre
PLA	Poly(lactic) acid
PP	Polypropylene
PS	Plasticized starch
PVA	Poly(vinyl alcohol)

RH	Relative humidity
SCB	Sugarcane bagasse
SEM	Scanning electron microscopy
T	Temperature
TEM	Transmission electron microscopy
VC	Variation coefficient
WAXS	Wide-angle X-ray scattering
X_{CR}	Crystallinity index determined by X-ray diffraction
XRD	X-ray diffraction
ZP	Zeta potential

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Abstract

Sustainability based on healthy ecosystems and environments is the target idea of today's development, and therefore, it is necessary to follow the same objectives also when studying fibres for new and additional applications; consequently, renewable natural materials with high added value are intensively researched.

An overview of some natural plant sources of cellulose fibres, which have not traditionally been used for the mass production of fibres, is given in the manuscript. Recent research results of fibre properties isolated from non-conventional plants are described. Besides, potential applicability in the field of nanocrystalline cellulose of some of these fibres is reviewed.

In addition, a study of fibres extracted from nettle (*Urtica dioica*), Spanish broom (*Spartium junceum*), lucerne (*Medicago sativa*), weeping willow (*Salix babylonica*), balm-leaved archangel (*Lamium orvala*) and therefrom-derived nanocrystalline cellulose is presented and compared to hemp (*Cannabis sativa*) fibres.

Keywords Sustainable materials · Cellulose fibres · Non-conventional cellulose fibres · Properties · Nettle (*Urtica dioica*) · Spanish broom (*Spartium junceum*) · Balm-leaved archangel (*Lamium orvala*) · Lucerne (*Medicago sativa*) weeping willow (*Salix babylonica*) · Nanocrystalline cellulose