

SpringerBriefs in Molecular Science

Biobased Polymers

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Surface Properties of Non-conventional Cellulose Fibres

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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