

Design and development of nanostructured bio-based coatings for surface properties implementation in sustainable applications

Giulia RANDO¹, Silvia SFAMENI¹, Elisabetta SCALONE^{1,2}, Maria Rosaria PLUTINO¹

¹ Institute for the Study of Nanostructured Materials, ISMN-CNR, URT of Messina, c/o Department of ChiBioFarAm, University of Messina, Viale F. Stagno d'Alcontres 31, 98166 Messina, Italy

² Department of ChiBioFarAm, University of Messina, Viale F. Stagno d'Alcontres 31, Vill. S. Agata, 98166 Messina, Italy

giulia.rando@cnr.it

Wood not oil!

Functionalized nanoclays
Bio-coatings
Bio-polymeric blends Or water-based blends
Sustainable plastics and functional membranes
Cellulose extraction from natural derived materials
Alkaline treatment
Bleaching
Development of multicomponent materials based on bio-composites and eco-friendly methodologies for obtaining sustainable functional coatings for textile substrates.
Standard EN 16575:2014
«Bio-Based»
«fully» water & bio-Based
Natural additives (i.e. phytic/tannic acids, fatty acids, natural polyphenols)

Textile finishings

Functional nanofillers
Waste/natural derivatives
(Blended) polymers
Green Chemistry
Pad-dry-cure process
Dip-coating process
PROPERTY

- Hydrophobic
- Antibacterial
- Resistant to external agent
- Consolidant
- UV-absorber
- Protective
- Self-cleaning
- Abrasion resistant
- Sensing
- Conductive

Encapsulation of active substances

Encapsulating Agent 1
Active molecule with antibacterial properties
Encapsulating Agent 2
Active molecule with antibacterial properties
Pristine resin
/DON-1
/DON-2
UV-protective
Antimicrobial
Wear-resistant
Water repellent

N-AC	N-WR	Vis-4	P-2030	P-2030
Cotton	PET	Cotton	Cotton	PET
Cot@N-AC	PET@N-WR	Cot@Vis-4	Cot@P-2030	PET@P-2030
Cot@N-AC/DON-1	PET@N-WR/DON-1	Cot@Vis-4/DON-1	Cot@P-2030/DON-1	PET@P-2030/DON-1
Cot@N-AC/DON-2	PET@N-WR/DON-2	Cot@Vis-4/DON-2	Cot@P-2030/DON-2	PET@P-2030/DON-2

Earth abundant materials

Water repellency
Weather resistant
Versatility
Geopolymeric textiles
Clays Secondary raw
Slug/ashes Brick waste
Mechanical features
Compressive strength
Tetraethyl orthosilicate (TEOS)
f-SiO₂ NPs
Untreated sample
geopolymer@f-SiO₂ NPs
Consolidant properties

Smart textiles

Functional coatings for hi-tech and smart textiles

Electroactive materials and nanomaterials for conductive e-textiles:
(a) Polymeric;
(b) Metallic;
(c) Carbon-based.

Energy/data storage
Data processing/communication
Sensors
Smart and hi-tech textiles
Actuators
Bio-based electroconductive coatings
Hybrid coatings with stimuli-responsive properties

Pristine	Dye1	Dye2	Dye3	Dye4	Dye5	Dye6	Dye7	Cot
ph=3								Cot@Sol
ph=7								
ph=11								
Pristine								Cot@Hy
ph=3								
ph=7								
ph=11								

Conductivity tests with AAA battery (1.5 V)