



Sustainable Medical Textiles



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Definitions

Textile

“woven fabric, fibres, filaments and yarns, natural and manufactured, and most products for which these are a principal raw material”

Medical Textile

“a textile structure which has been designed and produced for use in any of a variety of medical applications, including implantable applications”



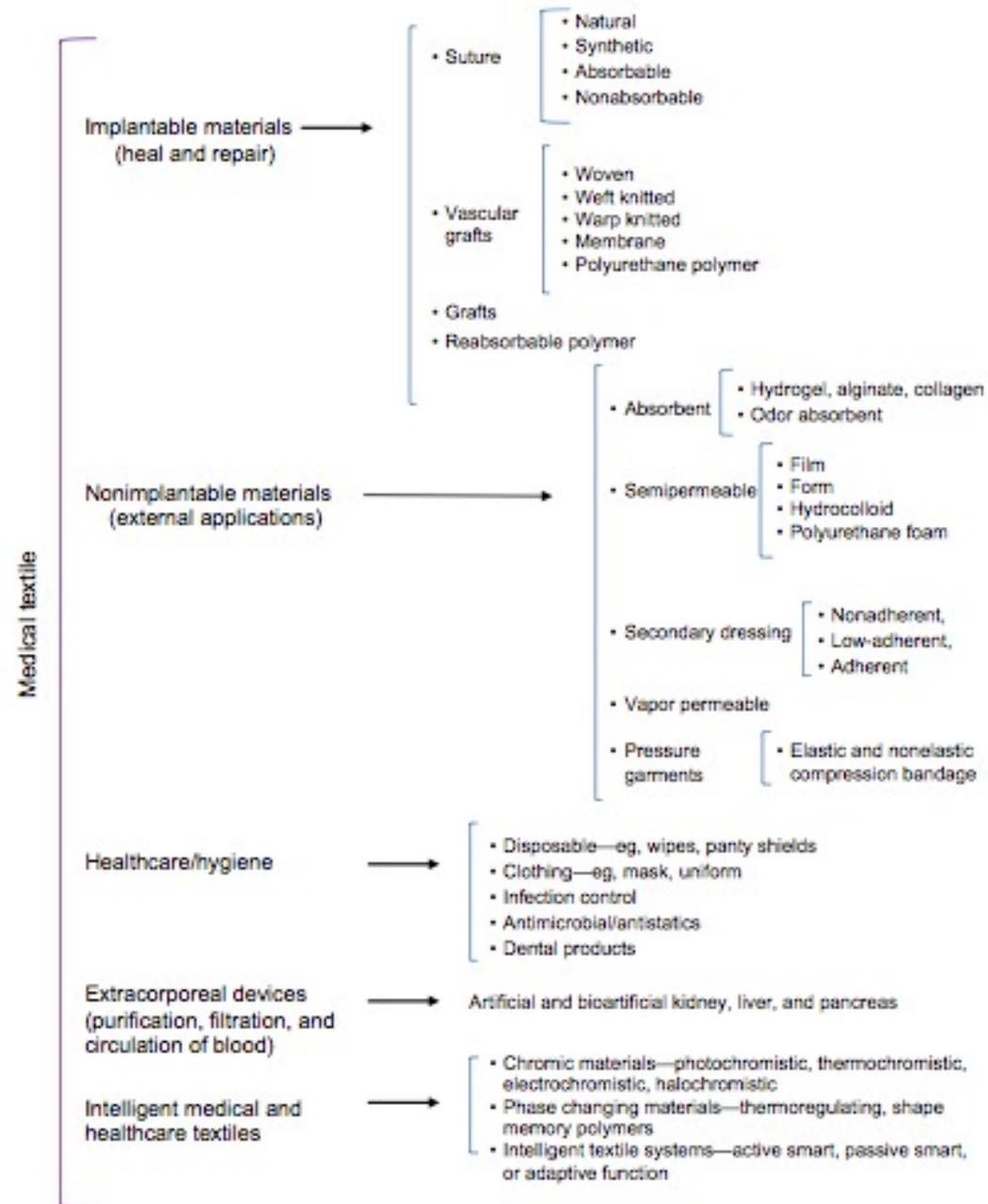
Medical Textiles

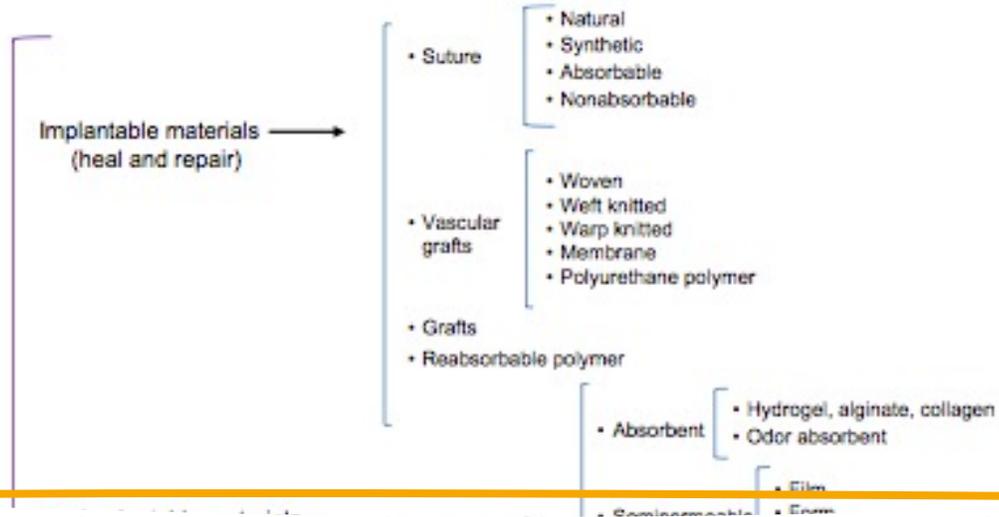
- Emerging subspecialist field
- First recognized as a field of the technical textile industry in 1995
- Between 2000 and 2021
 - 3238 papers published about medical textiles in journals recognized by Pubmed
 - 2075 of those published in last 5 years
 - 2077 on antimicrobial textiles



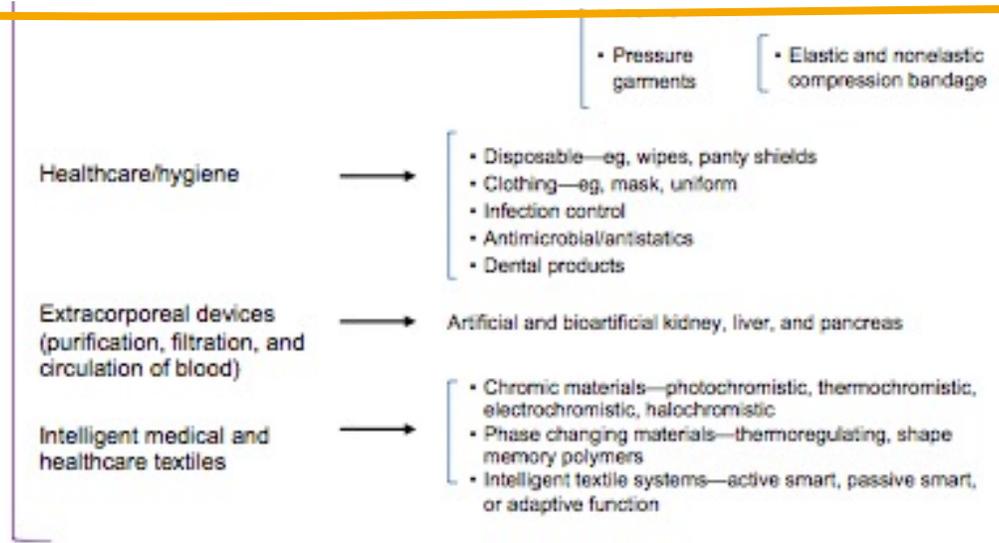
Currently

- Fastest growing sector of technical textile industry
 - 2020 USD 13 billion
 - 2026 USD 17-25 billion
 - Global orthopaedic market 2019 USD 45 billion
- Growth driven by
 - Technology - nanotechnology, electrospinning, new materials
 - Demand
 - Political agenda - sustainability





- Furnishing fabrics and textiles in fixtures and fittings in healthcare establishments
- Components of devices for environmental hygiene control



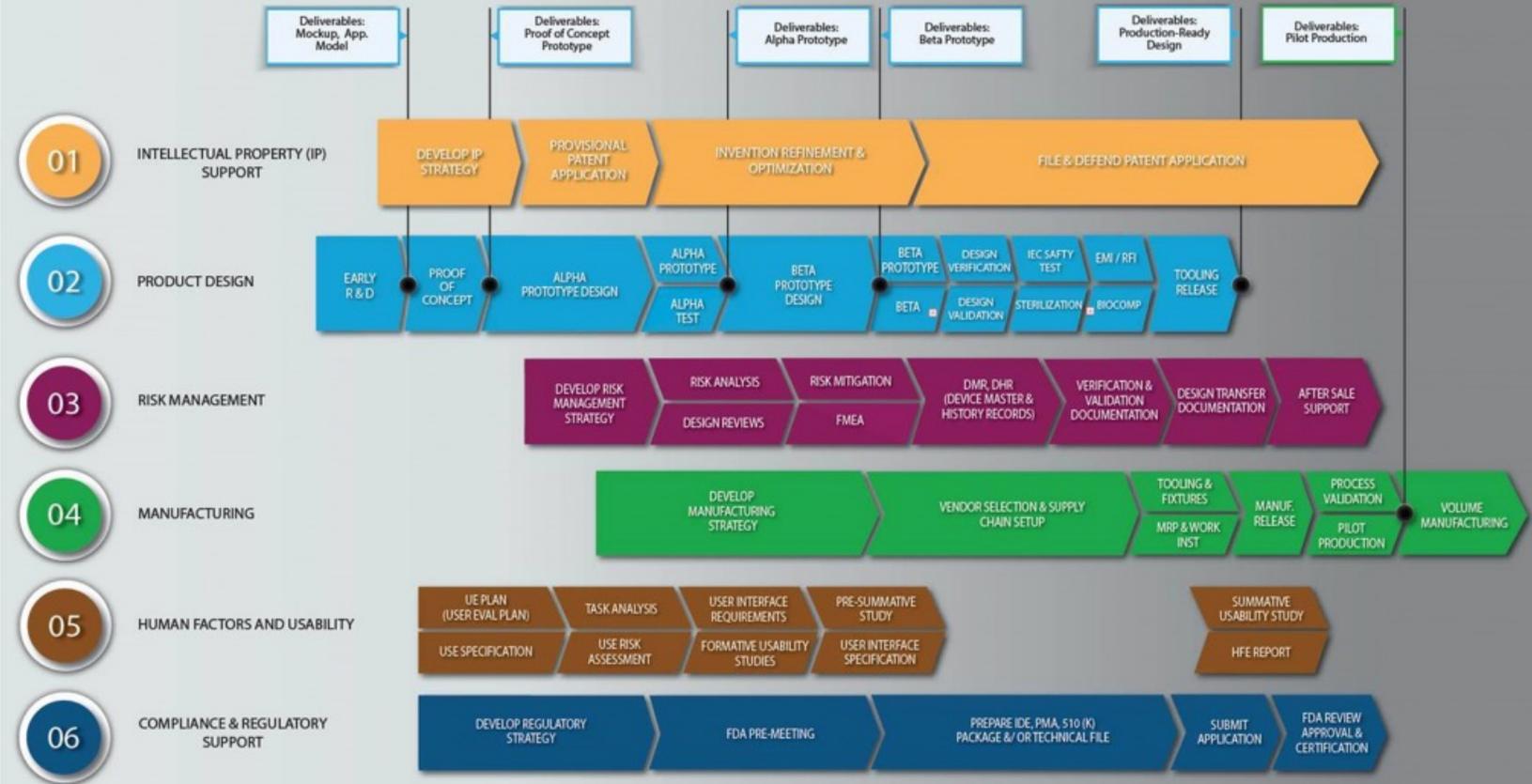
(Morris and Murray 2021)

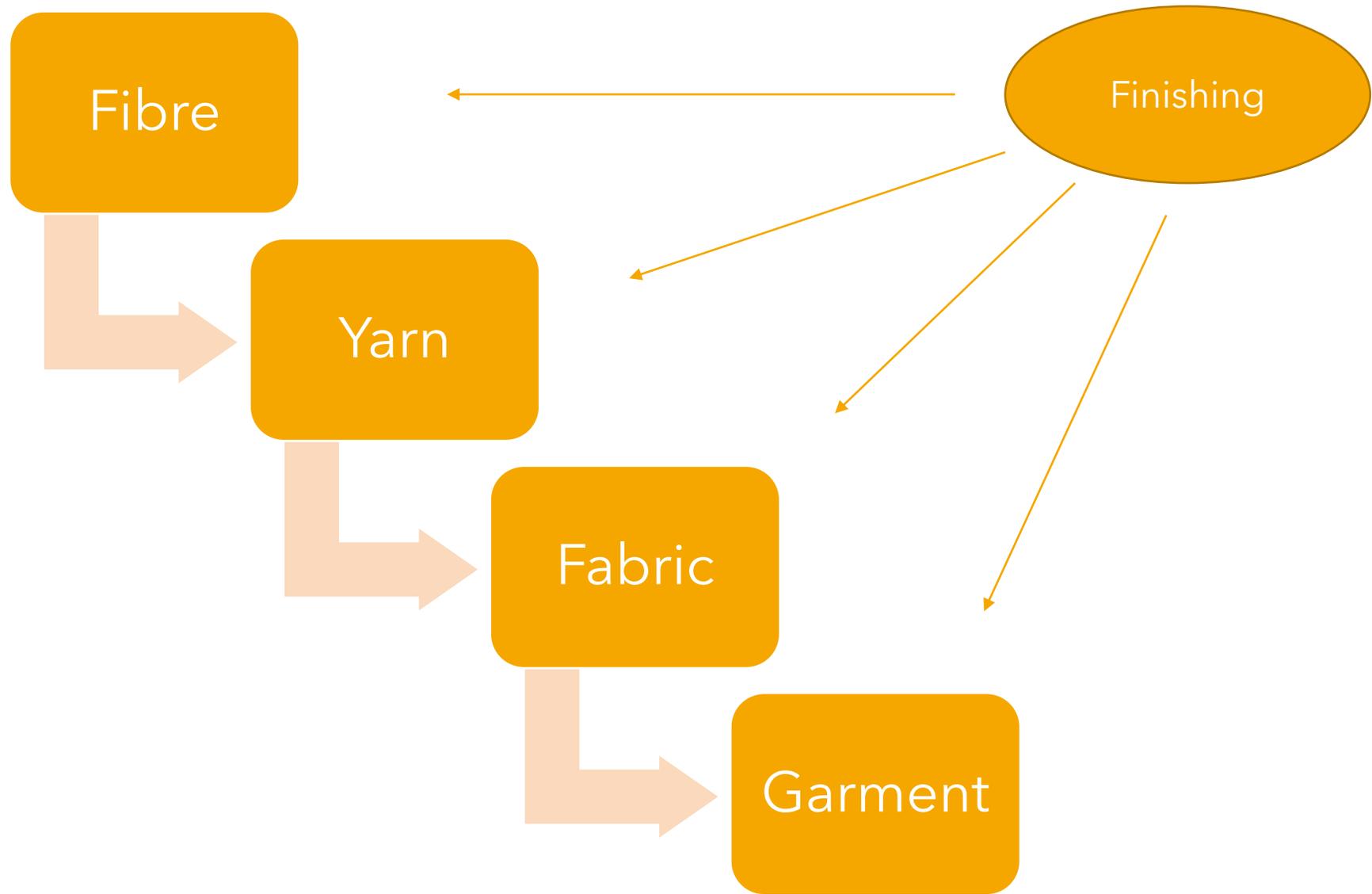
(Wang 2016, 132)

The Design Process



Medical Device Development Road Map





Properties of the device materials



Physical
structure, size,
permeability,
laundering



Mechanical
strength, durability,
flexibility, wear



Biological
antithrombogenic,
immunosuppressant,
antimicrobial,
pharmacological



Cosmetic



Economic



Environmental



Fibres and Filaments

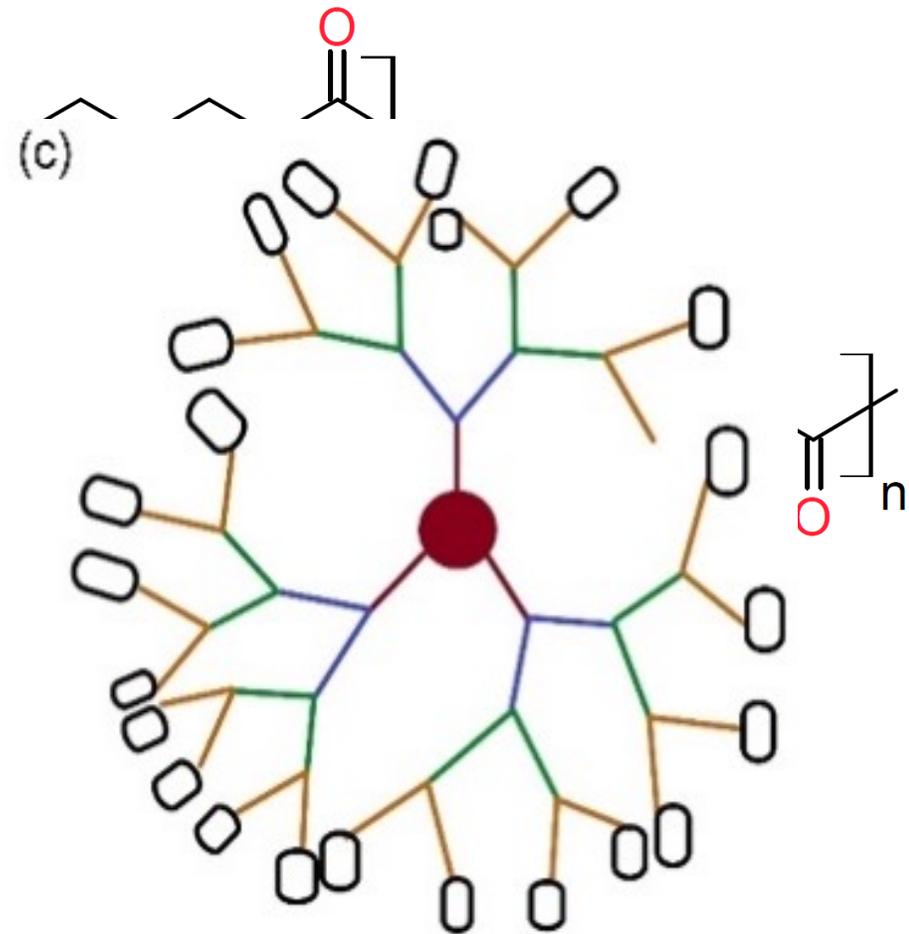
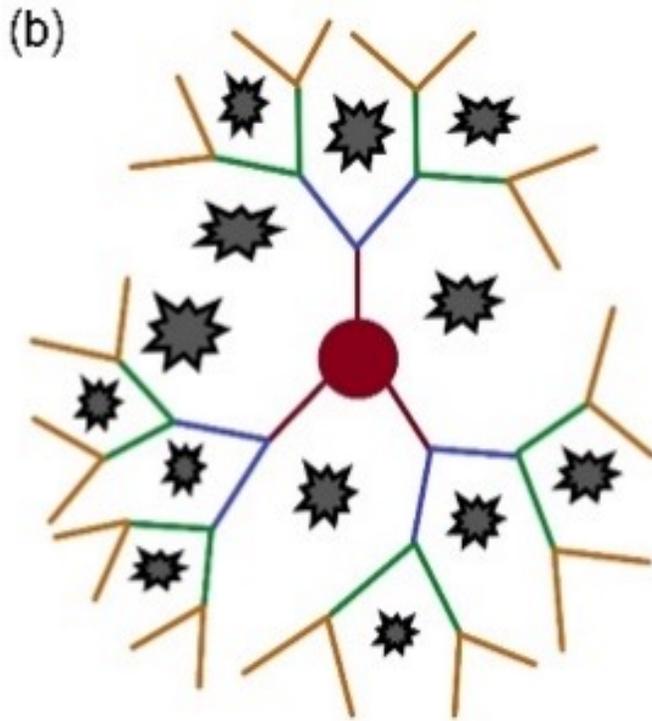
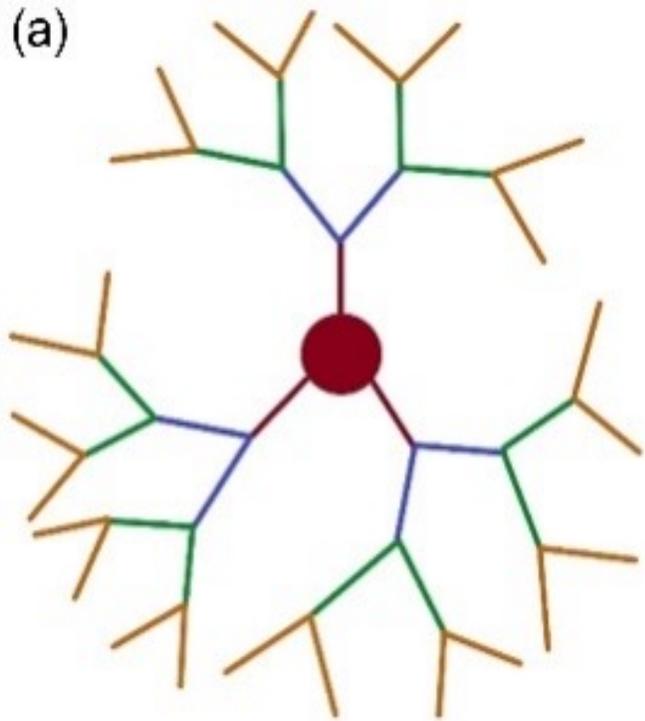
- Natural
 - Animal
 - Vegetable
 - Mineral
- Synthetic
 - Natural polymer
 - Synthetic polymer
 - Other

Fibres are

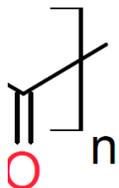
- Natural
 - Animal
 - Vegetable
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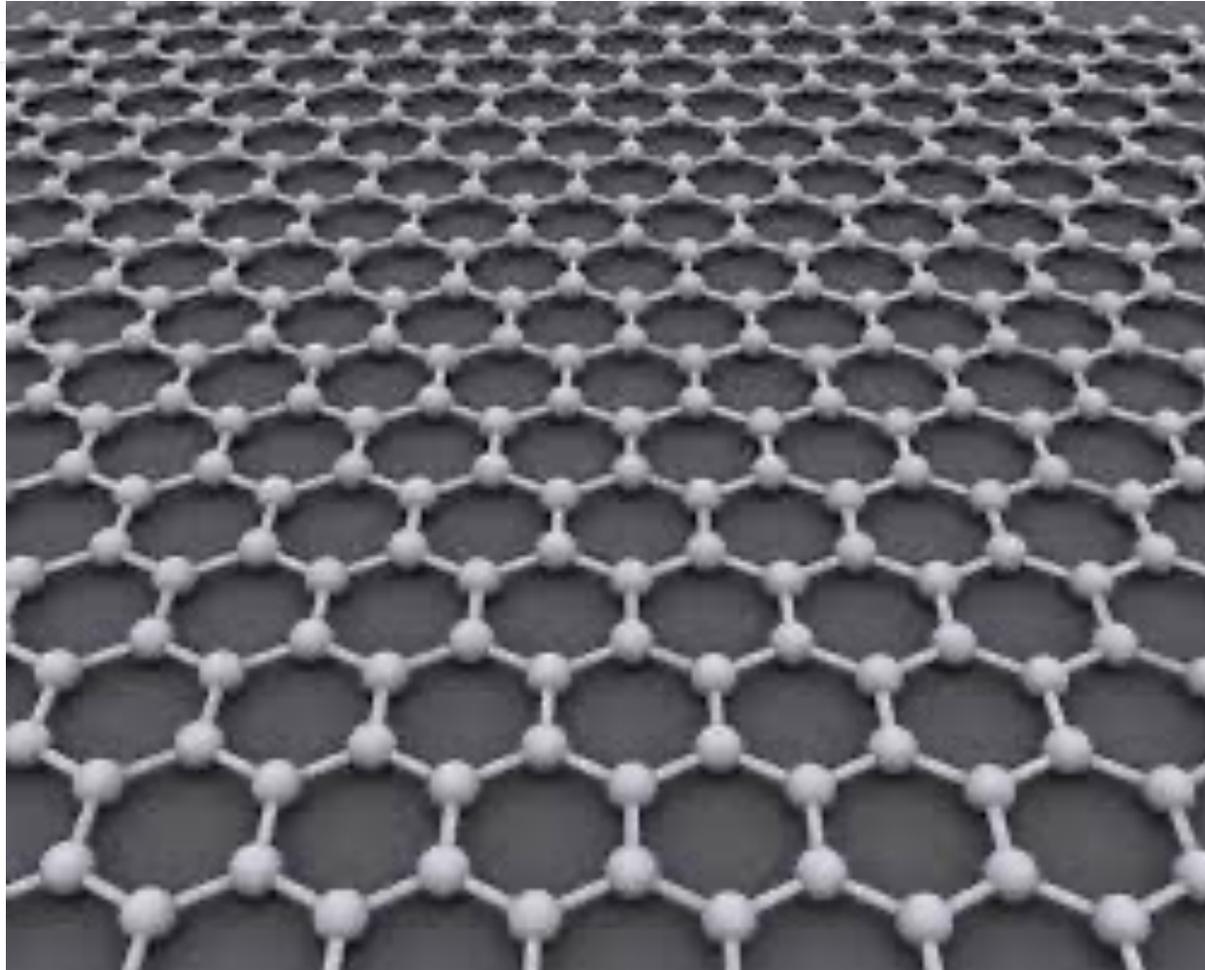
Fibres and Filaments

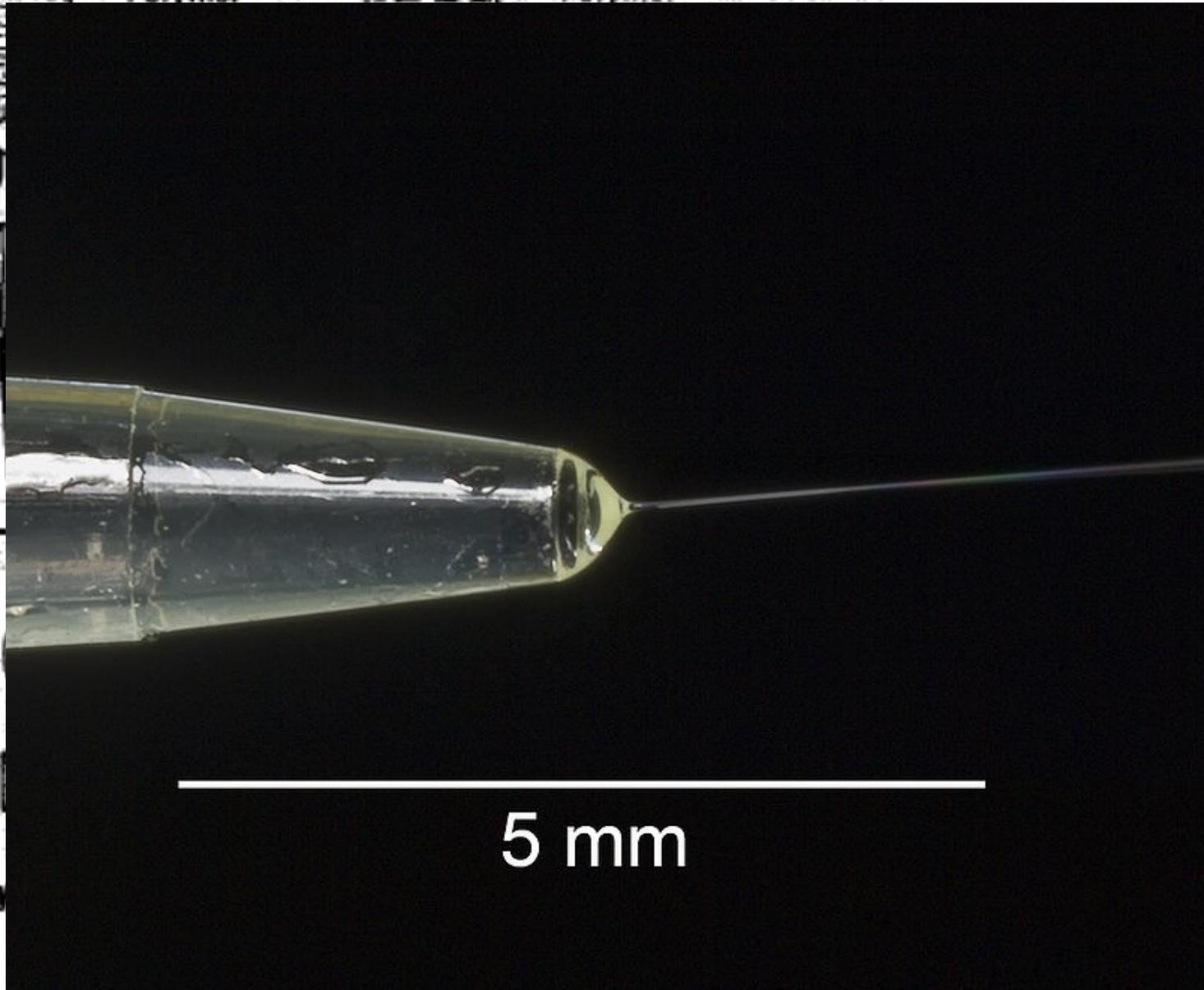
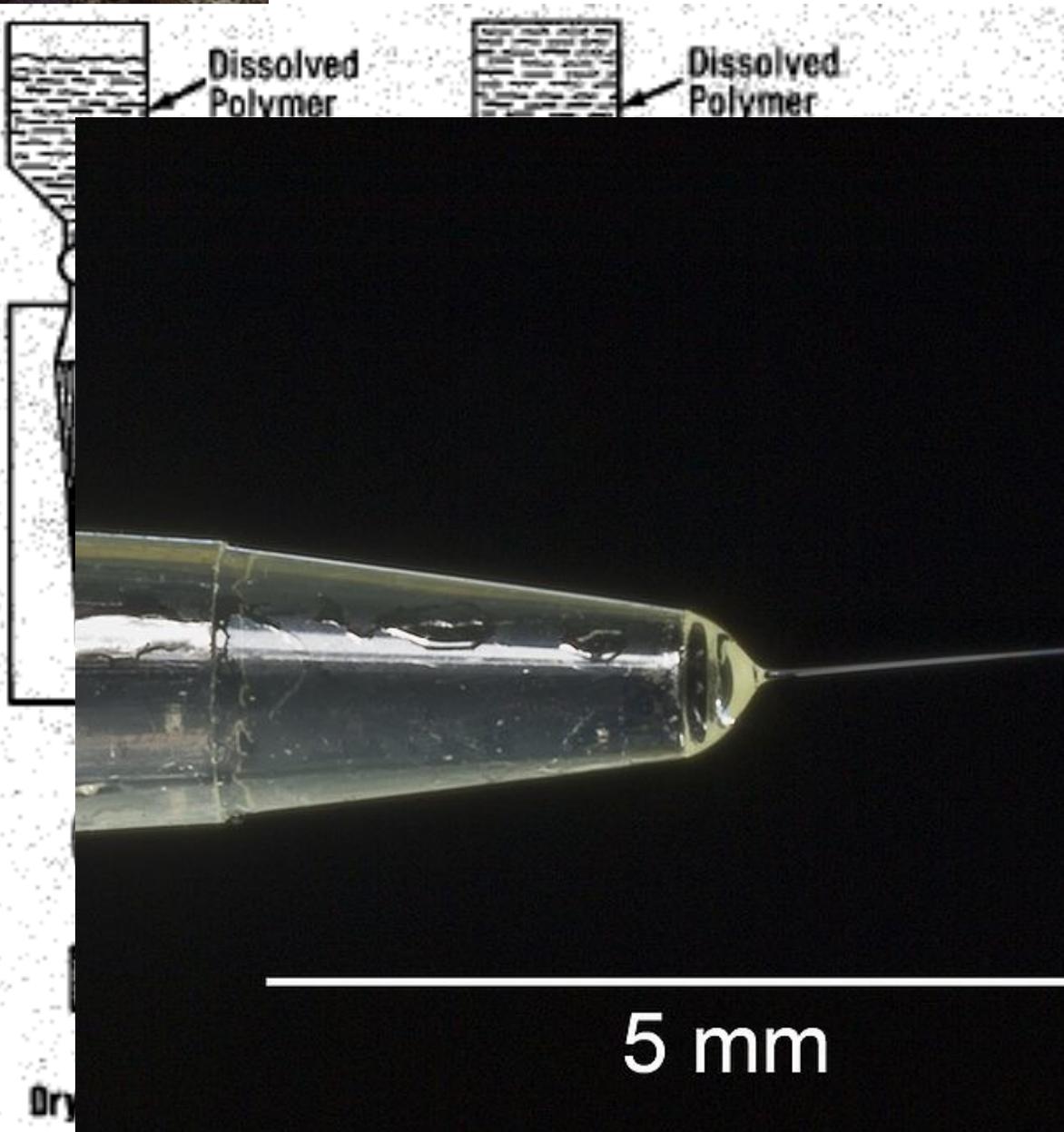
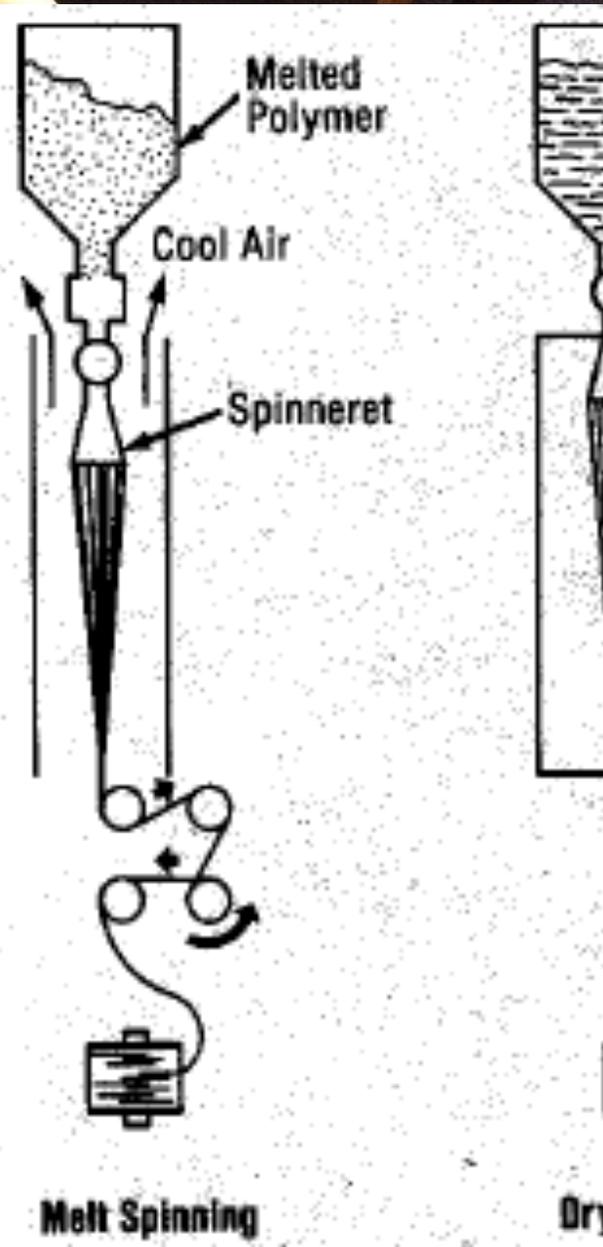


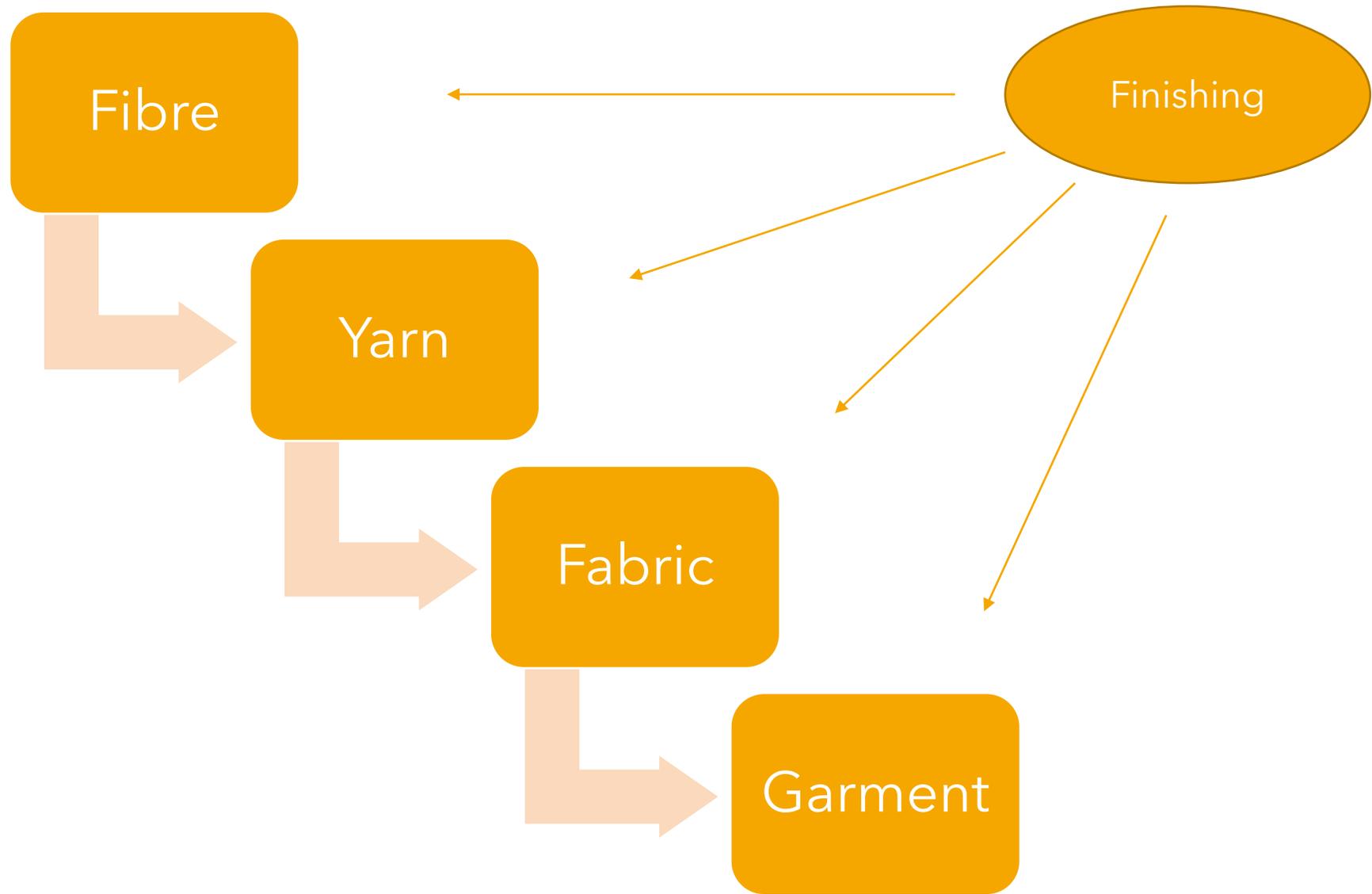
(PP)



Fibres and Filaments







Making a Fabric

- Main categories
 - Weaving
 - Knitting
 - Non Woven
- Other options
 - Braiding



Finishing of the fabric (fibre or yarn...)

- Many options
 - Surface modification
 - Heat treatment
 - Plasma treatment
 - Molecular imprinting
- Sterilisation
- Testing to determined standard



Applications

Healthcare/hygiene

- Linen - bed linen, blankets, curtains, patient clothing, hoist slings, staff clothing
- Chair/table covers
- Sanitary wear and incontinence products
- Wipes and cleaning materials
- PPE
- Environmental hygiene control



Manufacturing



(Images courtesy of Toray Textiles Europe Limited)

Manufacturing



(Images courtesy of Anze Limited)

References

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- Wang, L. 2016. "Performance testing of textiles" Cambridge: The Textile Institute, 132.