

Designing natural fibres for biocomposites

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Context



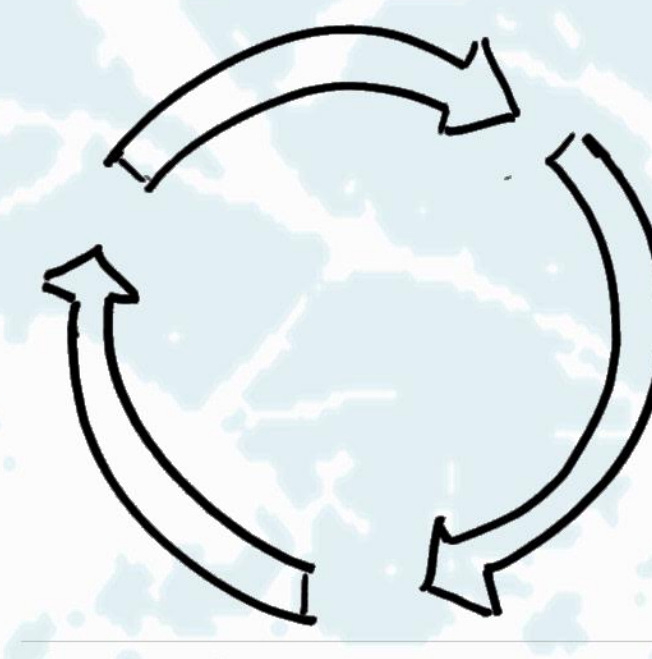
Plastic waste



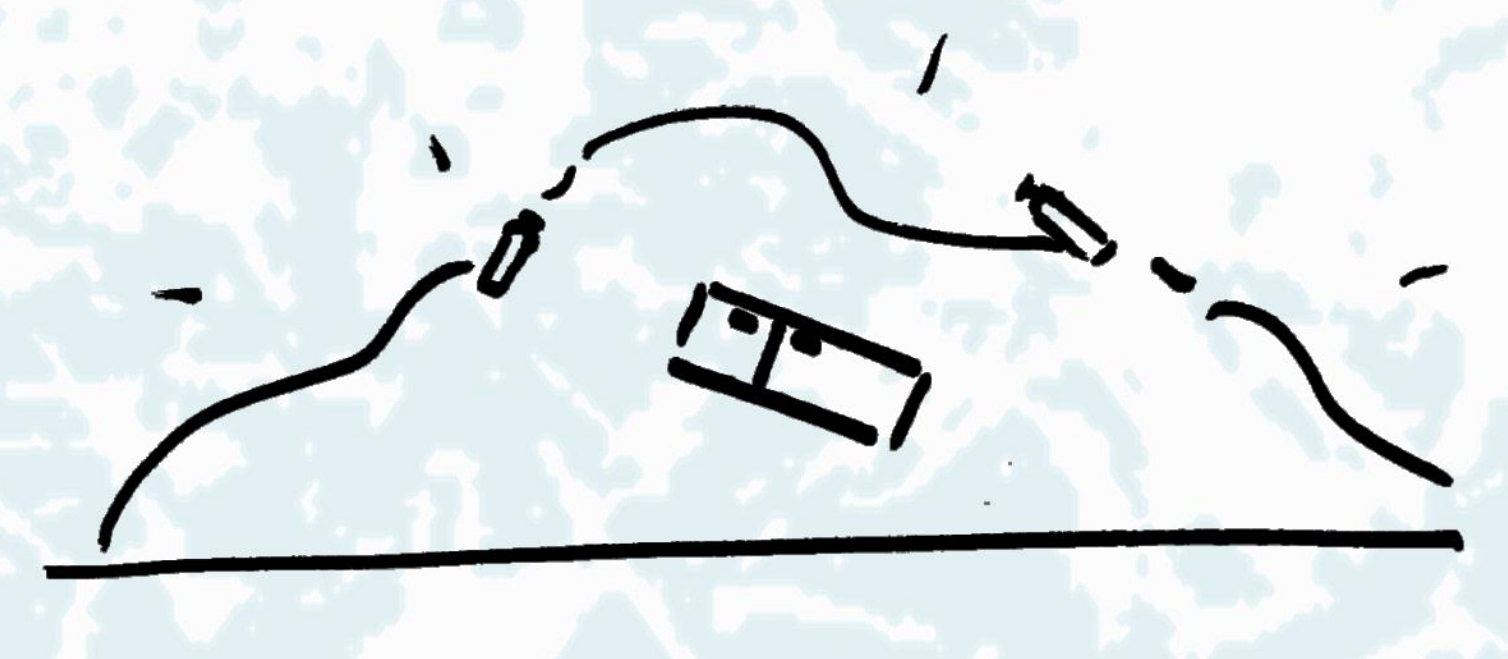
Treatments



Incineration



Recycling

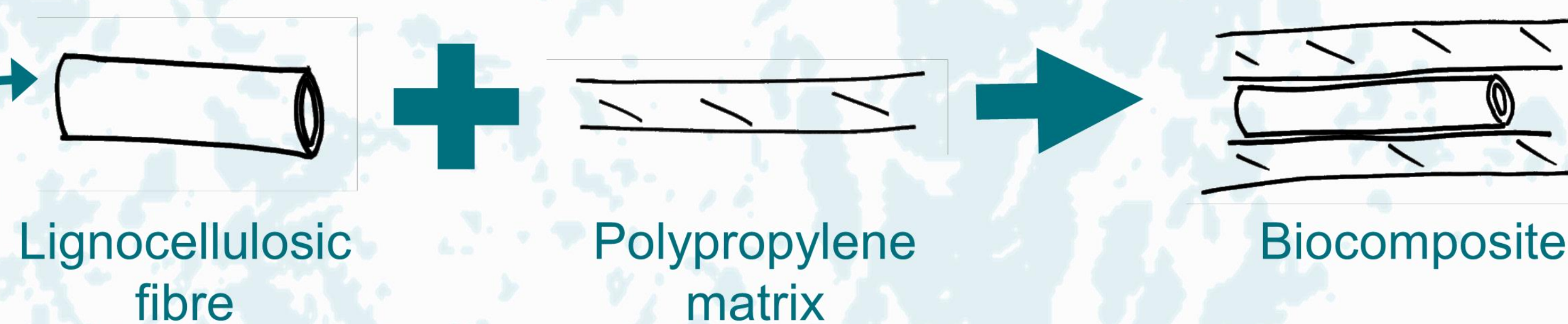


Landfiling

Incorporating natural fibres in polymer matrices is challenging as both components tend to repel each other. Industrial fibres specifications focus on multiple fibres parameters including fibres aesthetic, composition, cost and safety. The fibre chemico-enzymatic engineering is explored to modify and improve the fibres properties. We have developed in our lab a new and innovative enzymatic process. Our results demonstrate that fibres dispersity in the polymer is enhanced, mechanical resistance and fibres coloration modified after our enzymatic treatment

Alternatives and limitations

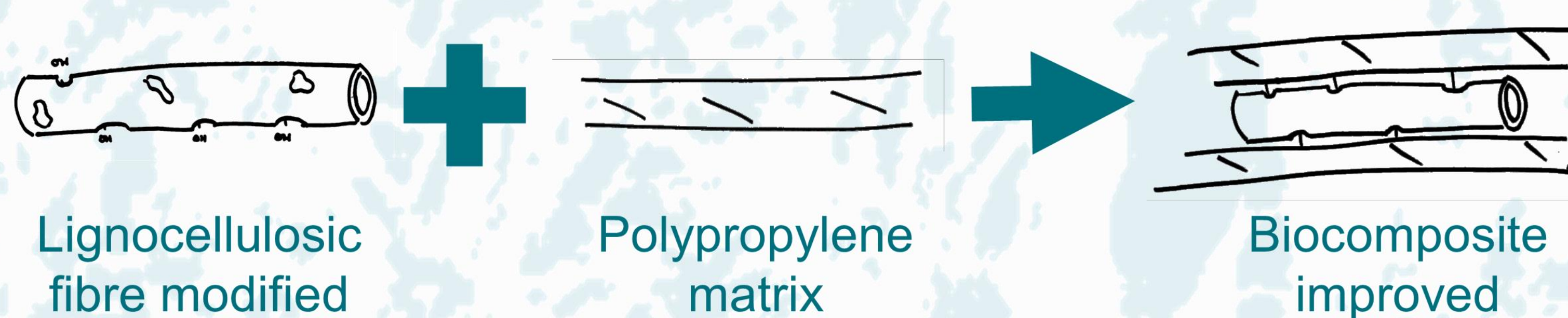
Extrusion of plastic matrix with fibres



- Light and resistant material
- Greener material fraction
- **Limitations**
- Full fibre potential unreached
- Fibre and Matrix incompatibility

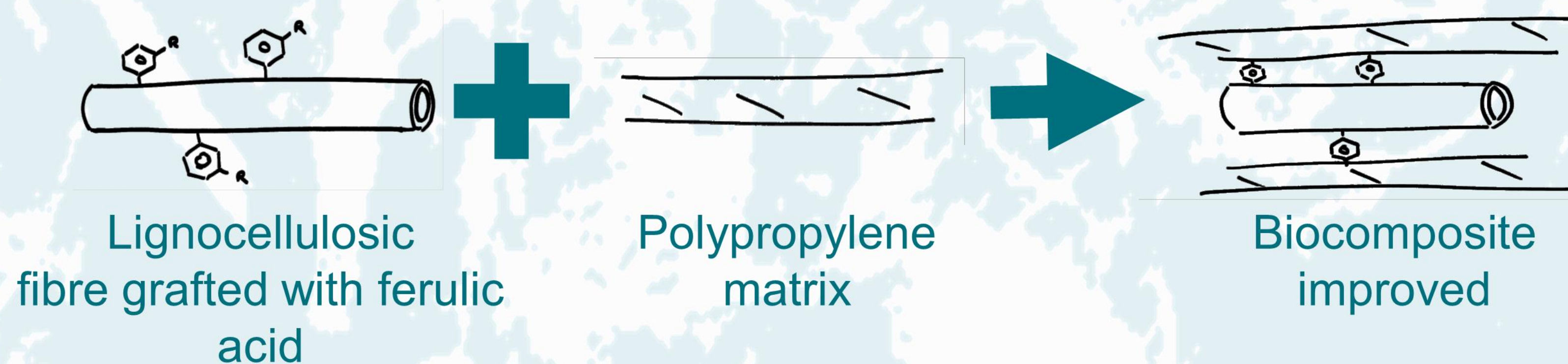
Improvement and properties

Low melting temperature mixture, reinforced by microwave/sonication



- Polysaccharide exposure at the fibres surface enhanced
- **Improvement (Morin et al, 2020)**
- Fibres higher crystallinity
- Bleaching effect

Enzymatic grafting (laccase)



- Color variation
- **Improvement (Morin et al, 2019)**
- Better elongation at break (+23 %)

Hemp or flax
bast fibres

Applications

Weight reduction
Lower fuel consumption
Lower plastic fraction

