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Ph.D. thesis (2018-2021)
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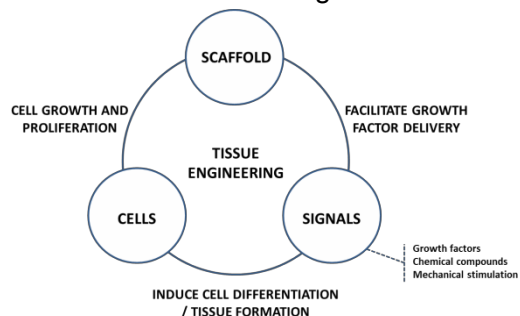
Cyclodextrin fonctionnalized nanocellulose for tissue engineering application

Fonctionnalisation de nanocellulose par des cyclodextrines pour des applications d'ingénierie tissulaire

Context

Tissue Engineering

- Biological substitute that **restore**, **maintain**, or **improve** tissue function or a whole organ



Nanocellulose

- Bio based and biocompatible
- High specific area
- Surface chemistry reactivity
- Good mechanical reinforcement

Recent studies assess the **good cytocompatibility** of wood-based CNF

Funded by



Glyco@Alps
Univ. Grenoble Alpes

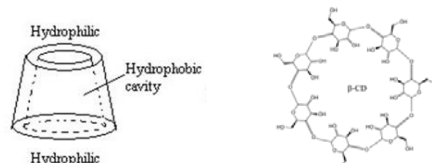
In collaboration with



Objectives

Cyclodextrin fonctionnalized CNF

- Natural molecule produced from starch
- Complexation with hydrophobic compounds (« **Cage molecule** »)
- Currently used in **pharmaceutical** and **drug delivery**



Growth Factor (GF)

- Usually a small protein, capable of stimulating cellular **growth**, **proliferation**, **healing**, and cellular **differentiation**.
- Encapsulation in cyclodextrin and controlled release

Drug delivery

- Increase the bioavailability of poorly soluble drugs
- Topical / Internal applications

Methods

Multiple binding strategies

- Adsorption
- Direct grafting
- Cross-linking
- Chemical modification of CNF and CD

Various type of substrats

- Films
- Aerogels/Cryogels

Model molecules

- Bovine Serum Albumine to modelize growth factor
- Drug release



Characterization

- FTIR, XPS, QCMD...
- Similarity between cellulose and cyclodextrin → **Indirect methods**
Phenolptalein absorption....

