

Cellulose nanofiber for biomedical materials

Keywords: Minimally-invasive therapy, Hydrogel, Biopolymer

Akihiro Nishiguchi

Biomaterials Field / Polymeric Biomaterials Group

NISHIGUCHI.Akihiro@nims.go.jp | https://samurai.nims.go.jp/profiles/nishiguchi_akihiro



Background

- In ultra-aging society, biomaterials for minimally-invasive therapy is required.
- Cellulose nanofiber (CNF) is promising as lightweight, reinforcing materials.
- However, biodegradable CNF has not been developed.

Aim

- Functional biomaterials of biodegradable CNF was developed.
- Injectable gels and artificial bones with nanofibrous structures are fabricated.
- Biocompatible, functional biomaterials have potential for tissue regeneration.

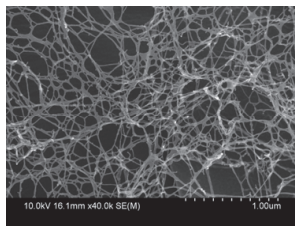
Advanced Research Topics



Wood

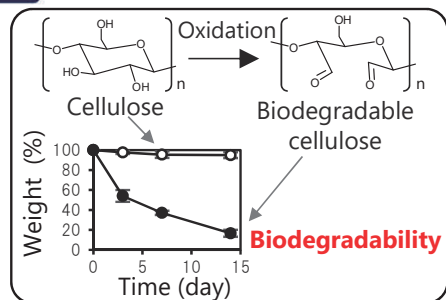


Pulp fiber

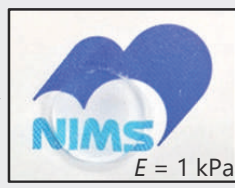
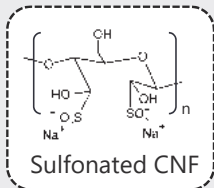


Cellulose nanofiber (CNF)

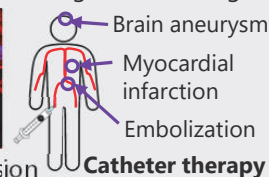
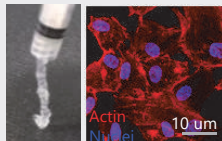
- Lightweight
- Reinforcing
- Surface area
- Gas barrier
- Biocompatible
- Transparent
- **Non-biodegradable**



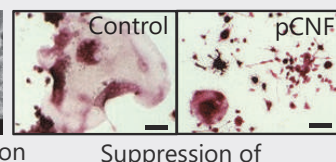
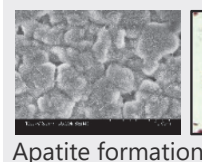
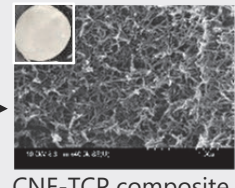
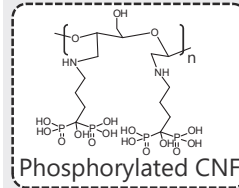
Injectable gel



Biodegradable CNF gel



Artificial bone



Applied area and future prospects

- Therapy for myocardial infarction
- Embolization for brain aneurysm
- Artificial bone
- Cell culture scaffold and drug delivery carrier

Issues for technology transfer

- Optimization of production process
- Regulation of biological response
- Establishment of sterilization process
- Design of delivery device