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Reusable Cellulose Nanofibrils-based Cryogels for Oil Absorption: Synchrotron Tomography and Deep Learning Evaluation

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Introduction





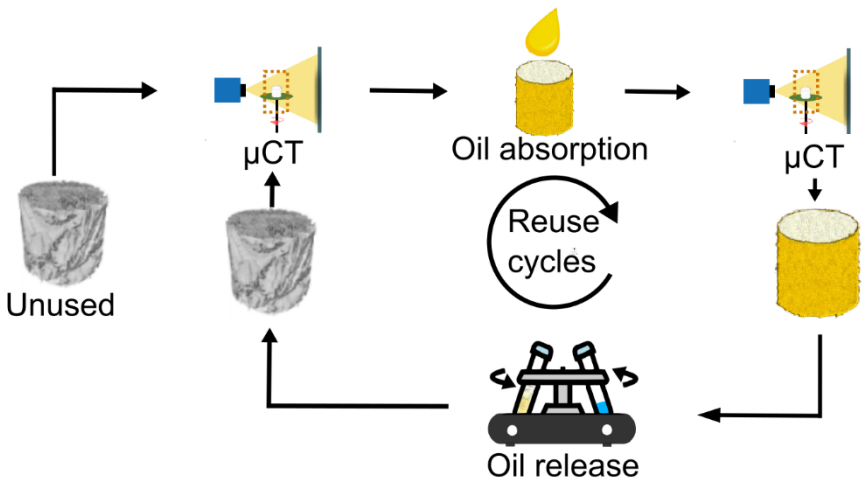


Methodology

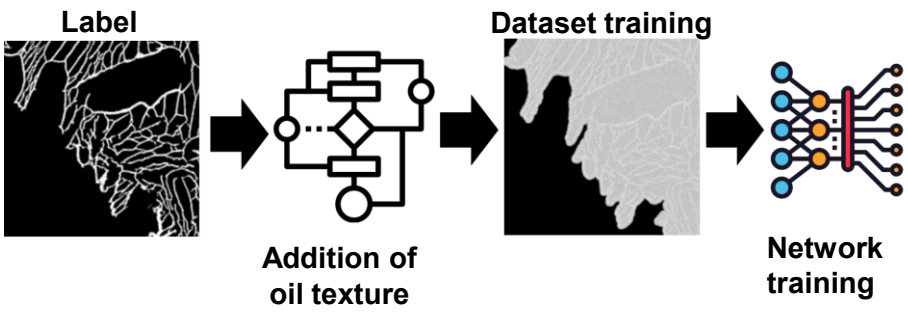
Nanocellulose-based cryogel for oil removal



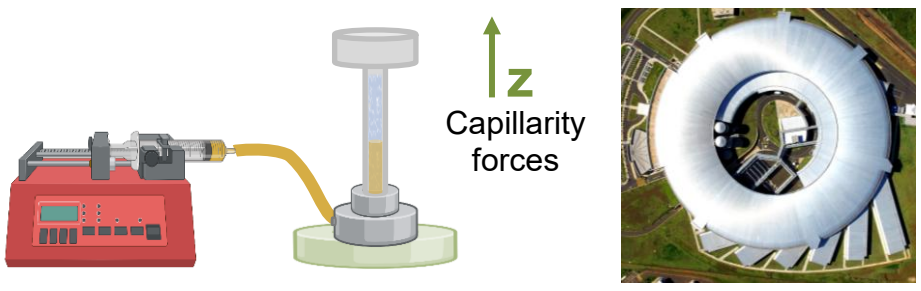
Cryogel structural investigation by X-ray microtomography



SA-Unet: a deep-learning protocol

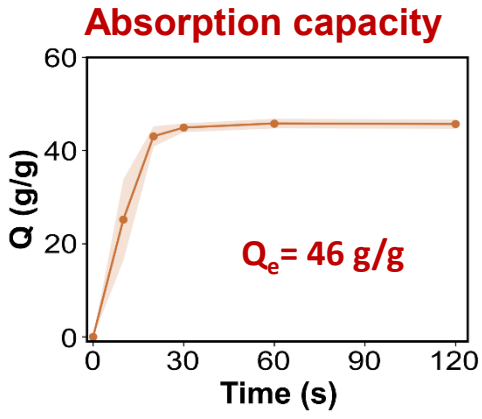


Time-resolved tomography in Synchrotron beamline

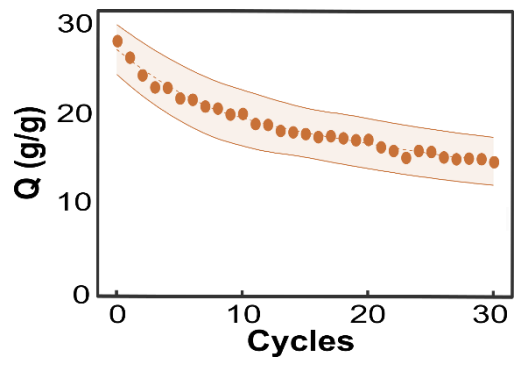


Results and discussion

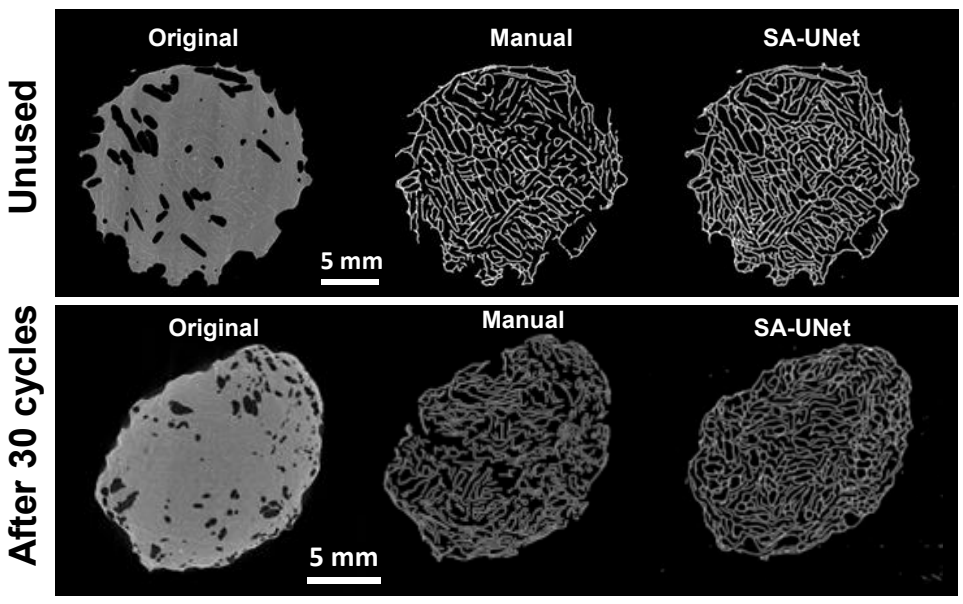
Absorption capacity



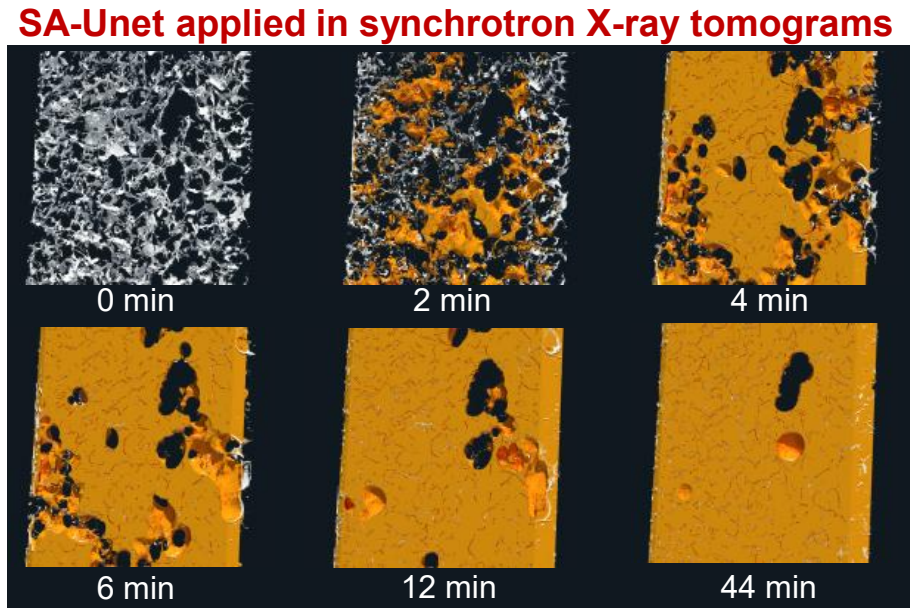
Reuse validation



Deep-learning method for low contrast X-ray tomograms



SA-Unet applied in synchrotron X-ray tomograms



Conclusions

- The bio-based CNF/NRL cryogel presented **high oil absorption** (46 g/g)**;**
- The cryogel can be reused for at least **30 cycles** through solvent-free centrifugation desorption method;
- **Deep leaning** approach improved contrast between oil and wall of tomograms;
- Benchtop X-ray microtomography demonstrates **mechanical resilience** after 30 reuse cycle;
- SA-Unet was successfully applied to synchrontron tomograms.

References

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