

**Onajite
Abafe Diejomaoh**

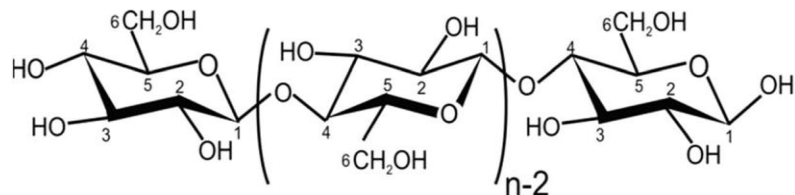
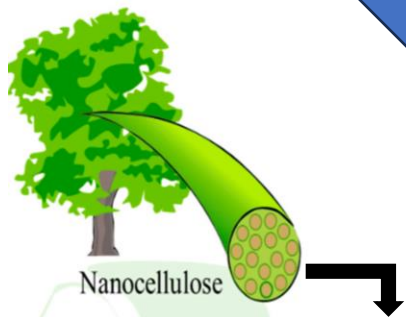
Research Associate in
Bio-based
Composites and ED&I

**Surface modification of
cellulose nanocrystals with
ionic liquids for
hydrophobicity and high
thermal stability**

Introduction



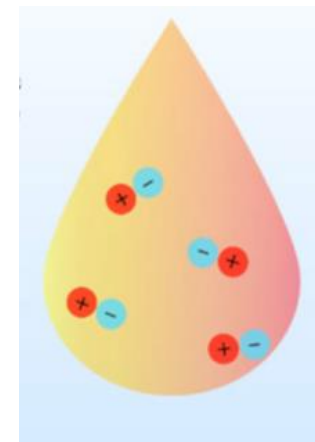
Current global issues from fossil-based materials



Cellulose



Sustainability & Green chemistry



Ionic liquids

Ionic liquids (Green solvents) are salts with low melting points $<100\text{ }^{\circ}\text{C}$

Properties and application of Ionic liquids:

Low vapour pressure

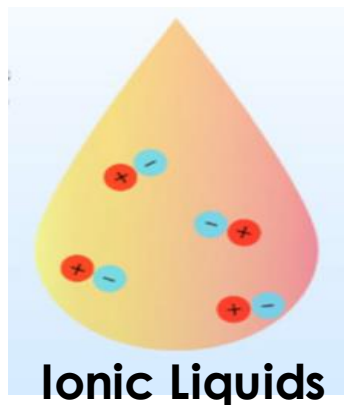
Low flammability

High conductivity

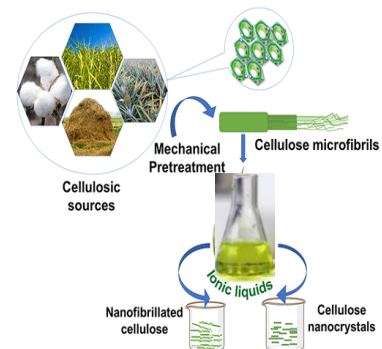
High chemical/thermal stability

Wide liquid range

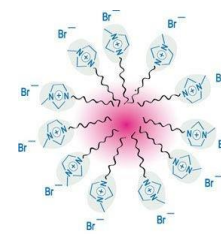
Designer solvents



Production of CNMs



Surfactants



Lubricants

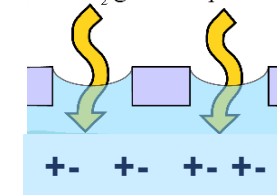


ILs

Electrolytes



CO₂ gas absorption

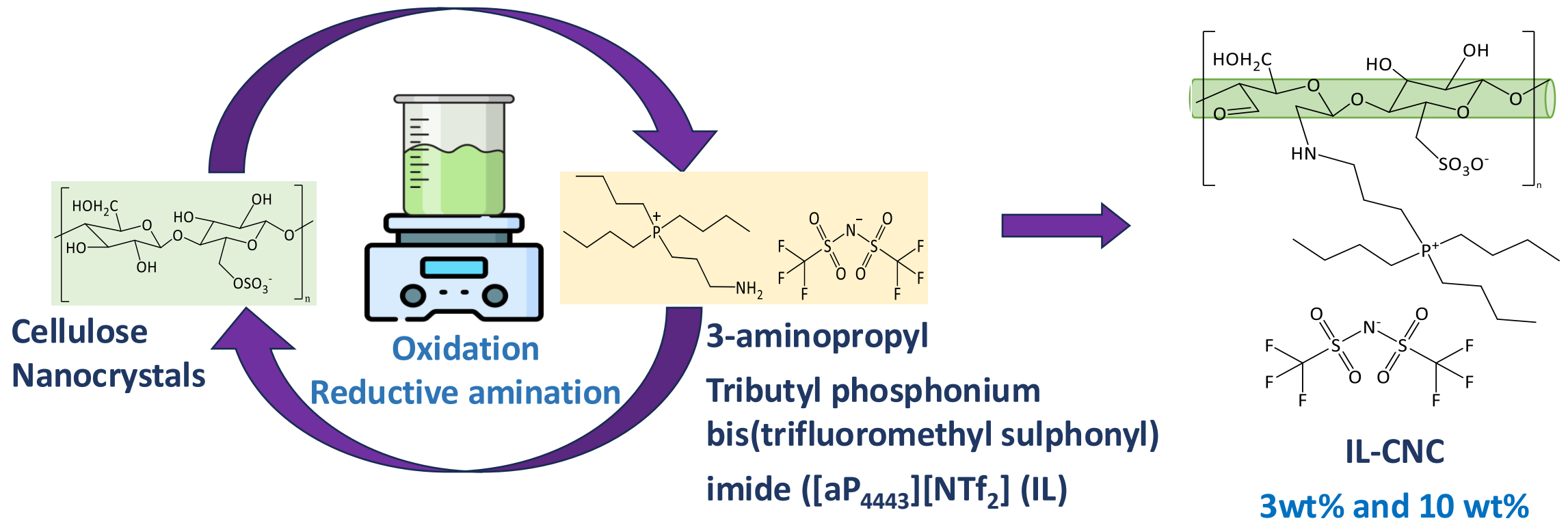


CO₂ Absorption

Super-hydrophobic coatings

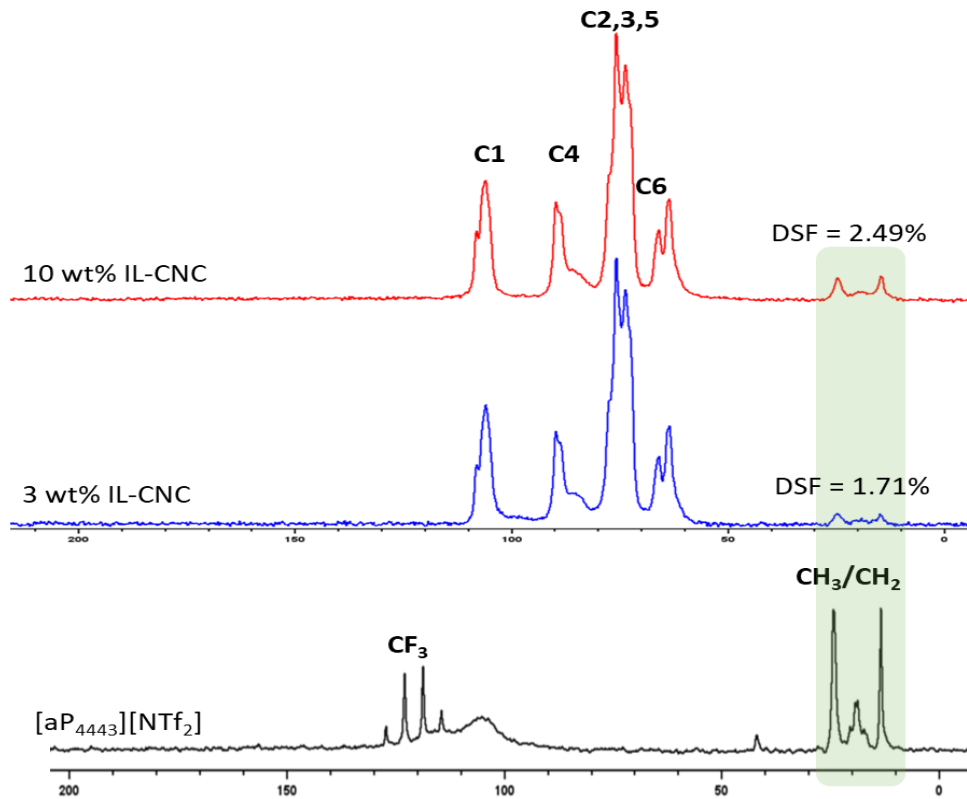


Surface modification of cellulose nanocrystals with ionic liquid ([aP₄₄₄₃][NTf₂])

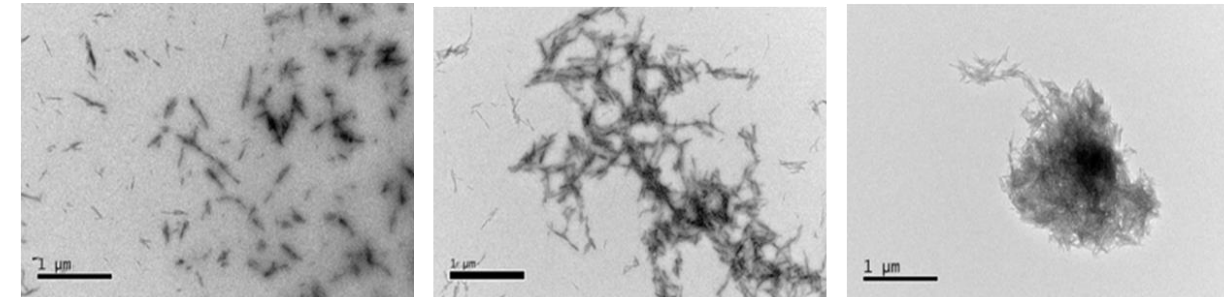


Effect of modification on the properties of CNCs

Structure: ^1H - ^{13}C CP/MAS NMR spectra of CNCs



Morphology: TEM images of CNCs



sCNC

3 wt% IL-CNC

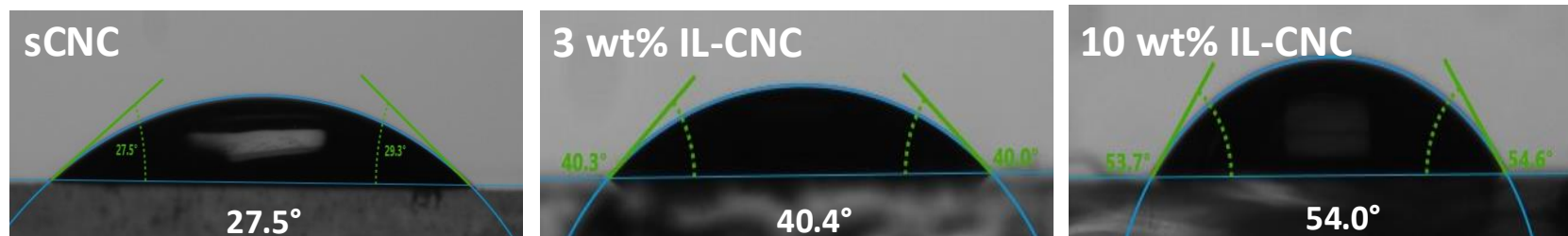
10 wt% IL-CNC

	Length (nm)	Width (nm)
sCNC	143 ±15.2	7.8 ±1.1
3 wt% IL-CNC	131.2 ±34.8	8.3 ±1.6
10 wt% IL-CNC	143.7 ±16.9	8.4 ±2.3

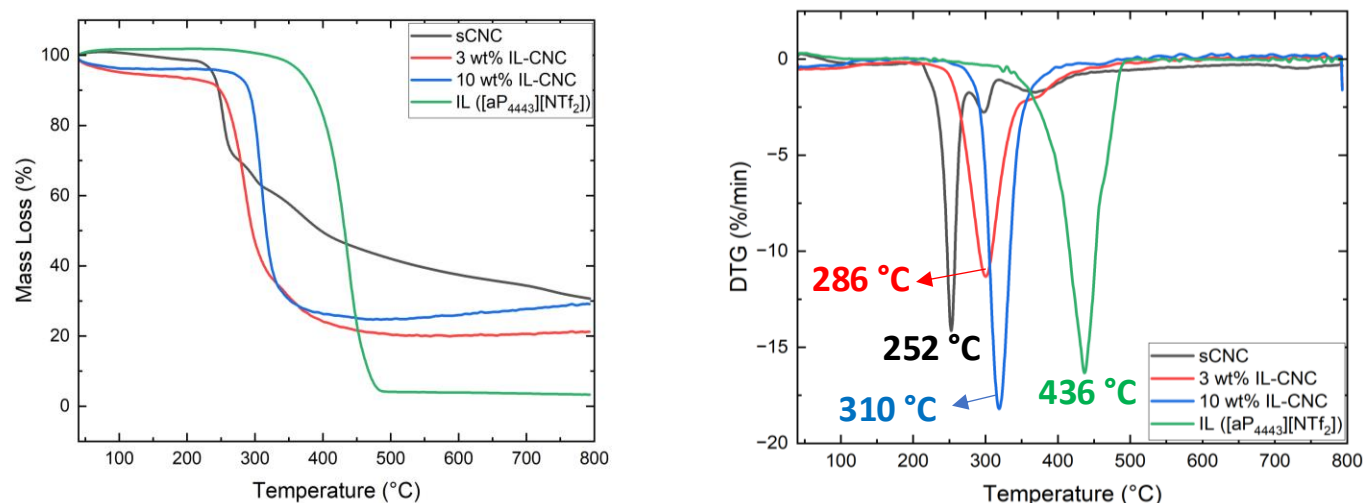
- ✓ CNCs retained their rodlike morphology
- ✓ No significant change in size
- ✓ Aggregation of CNCs

Effect of modification on Properties of CNCs

Surface properties: Water Contact Angles



Thermal degradation temperatures



✓ This work shows a promising green approach for producing moderately hydrophobic and thermally stable CNCs with ionic liquids.

Abafe Diejomaoh et al., Carbohydrate Polymers 344 (2024) 122519

THANK YOU FOR YOUR ATTENTION

Onajite Abafe Diejomaoh
o.abafediejomaoh@bristol.ac.uk