



# CARNOT INSTITUTE i2C

*SUBLIMATE CHEMISTRY TO ENHANCE YOUR FUTURE*

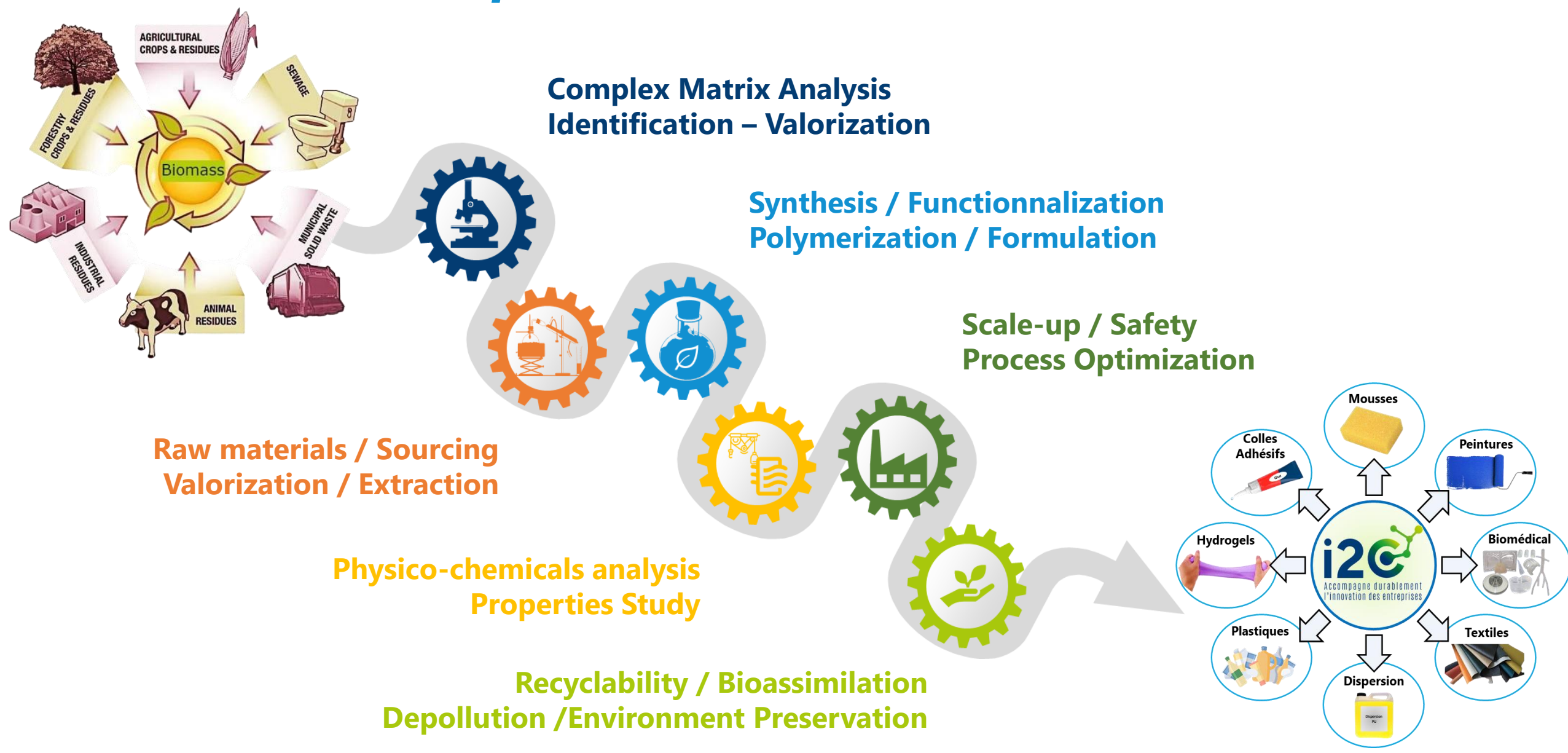


<https://carnot-i2c.fr/>



[Geraldine.gouhier@univ-rouen.fr](mailto:Geraldine.gouhier@univ-rouen.fr)  
[yannick.port-lougarre@univ-rouen.fr](mailto:yannick.port-lougarre@univ-rouen.fr)

## Expertise across Value Chain



## Biostimulant Activity



- ✓ **Soil nutrition**  
(disponibility / efficiency)
- ✓ **Rhizosphere**
- ✓ **Abiotic Stress tolerance**
- ✓ **Product Quality**

## Multi-scale measurement

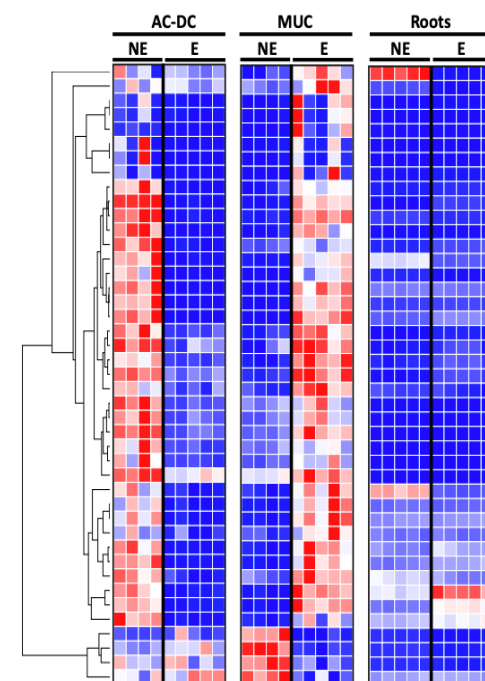
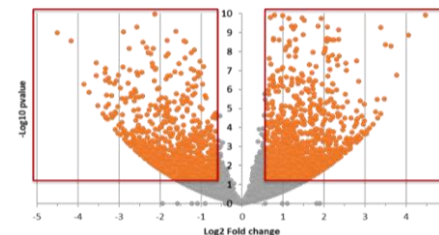
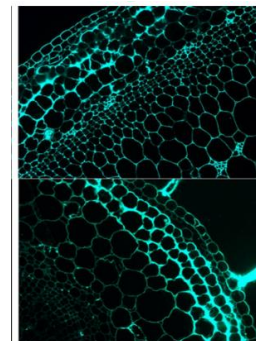


Phenological

Tissues, Leafs

Cellular

Molecular



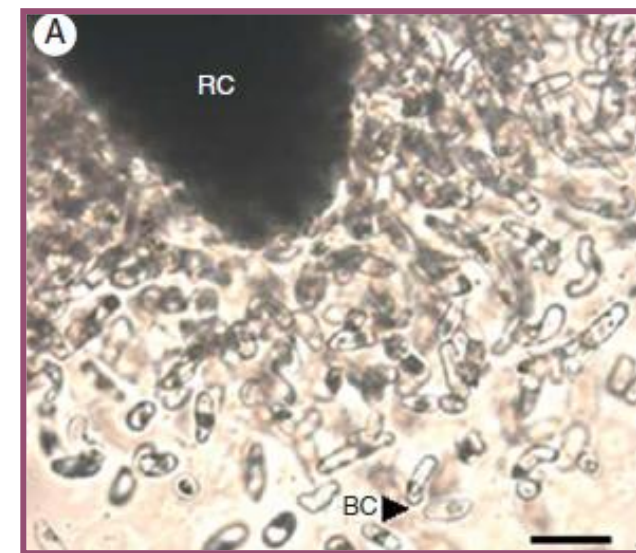


## *Biocontrol Activity*

- ✓ Mimic the presence of a pathogen
- ✓ Trigger molecular defense mechanisms
- ✓ Production of defense proteins
- ✓ Reinforce protective wall structures



- Recycling plant waste
- Invasive plants (algae)
- Chemical and extract libraries, ...



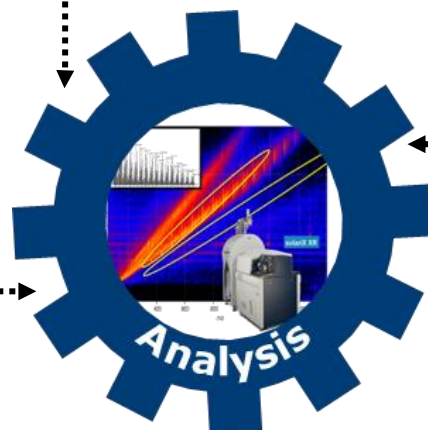
## *Analysis for a Sustainable Industry*

### Matrices

- Air, Gas, Fumes
- Water, Effluents
- Soil, Sludge
- Plants
- Waste, Co-products
- Materials, Polymers
- Petroleum, Tar
- Bio-oils, Bio-fuels

### Properties

- Mechanisms Understanding
- Environmental Impact
- Aging, Stability
- Sensory (*Odor, Color, Texture / Rheology, Taste*)
- Barrier properties (*Water, Gases, Solvents*)



### Methods

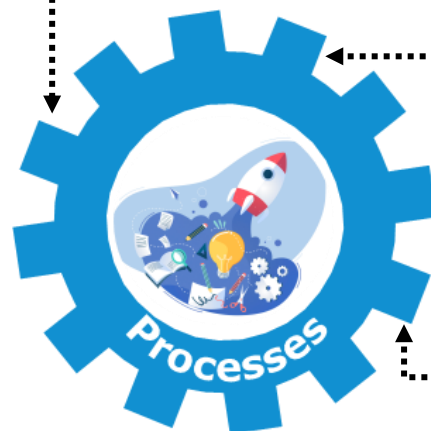
- Deformation
- Characterization
- Pollutants, Traces, Ultra-traces
- Degradation products
- 2D-mapping
- Molecular networks
- Omics
- Quality
- VOCs, Odors
- Targeted, Non-targeted

**50 M€** of equipment

## *Processes – Applications – Methods*

### **Eco-responsible Chemistry**

- Organic Synthesis
- Flow Chemistry
- Photochemistry
- Electrochemistry
- Catalysis
- Polymerization
- Crystallization
- Atomization
- Miniaturization
- Photo-polymerization



### **Barrier Properties**

- Selective Permeation
  - *Gases* ( $\text{CO}_2$ ,  $\text{He}$ ,  $\text{H}_2$ ,  $\text{O}_2$ )
  - *Water*
  - *Solvents*
- Surface Functionalization
- Membranes for Batteries

### **Activity Validation**

- Biocides
- Biostimulants
- Biocontrols
- Elicitors
- Antifouling
- Antioxidant
- Antibacterial



## *Valorization – Recycling – Depollution*

### Valorization

- Biomolecules Extraction
- Purification
- Bio-based Materials
- Bioactive Molecule Screening
- Formulation



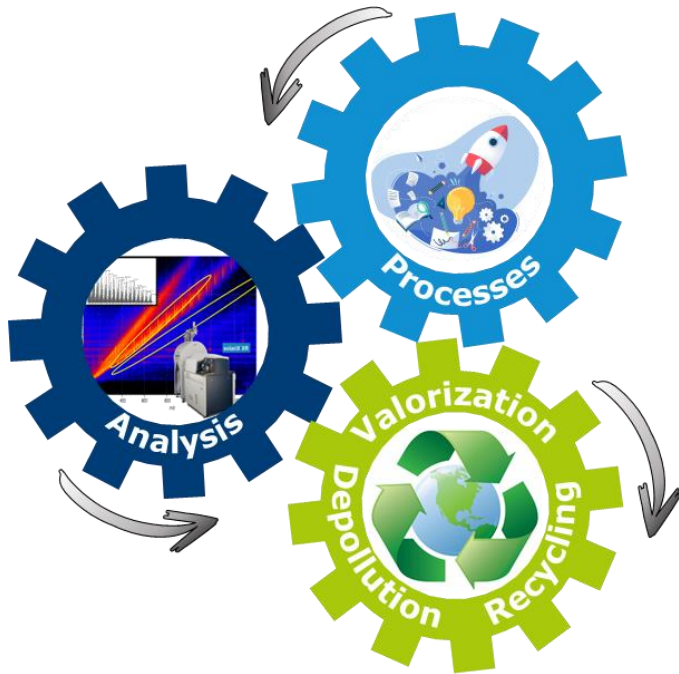
### Depollution

- Functionalized nanoparticles
- Membranes
- Bio-based filters
- Bioremediation
- Quality control

### Recycling

- Chemical Depolymerization
- Biopolymer Functionalization
- Biomaterials Insertion

## *A Support to Bioeconomy*



**Quality Management**  
*Certified ISO 9001 : 2015*

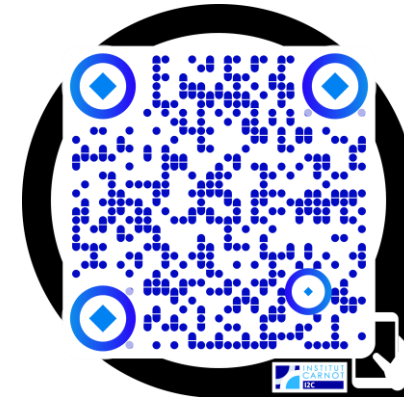


**One-Stop Shop**



Géraldine  
GOUHIER

[geraldine.gouhier@univ-rouen.fr](mailto:geraldine.gouhier@univ-rouen.fr)



Yannick  
PORT-LOUGARRE

[yannick.port-lougarre@univ-rouen.fr](mailto:yannick.port-lougarre@univ-rouen.fr)

**Contracts eligible to**



<https://carnot-i2c.fr/>