Cellulose Nanomaterials – A Path Towards Commercialization

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Process Development Center

UMaine Process Development Center

Serving the Needs of Industry Since 1987

- Department of Chemical and Biological Engineering
- Not-for-Profit Contract Research Group
- Self Supporting
- Professional Staff
- Fee-for-Service Basis

UMaine CNF Pilot Facility

- Upgrade funded by grant from USDA Forest Service - 2012
- Capability
  - CNF Refiner
  - Ultrafine Grinder
- Capacity
  - 1 ton/day
  - Slurry form (3% solids)

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UMaine CNF Pilot Facility

- Spray Dryer
  - o Several kg/day capacity

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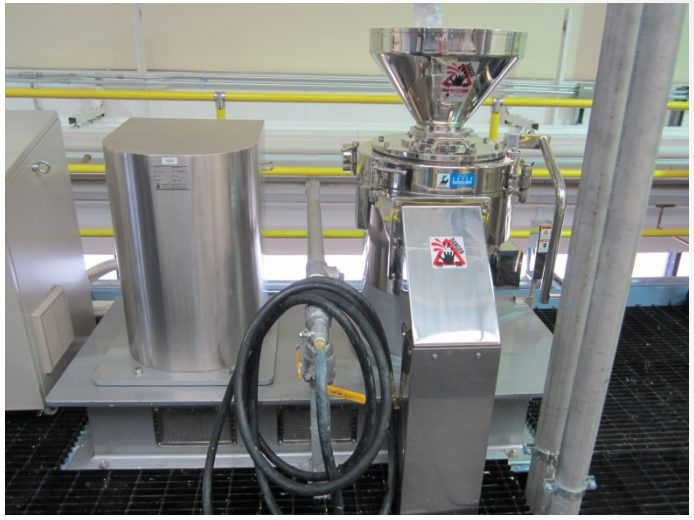
UMaine CNF Pilot Facility

- Availability
  - o Fee-for-service basis
  - o Samples available
    - Kg to tonne quantities
    - CNF & CNC
    - Slurry & Dry



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Cellulose Nanomaterial Samples Distributed

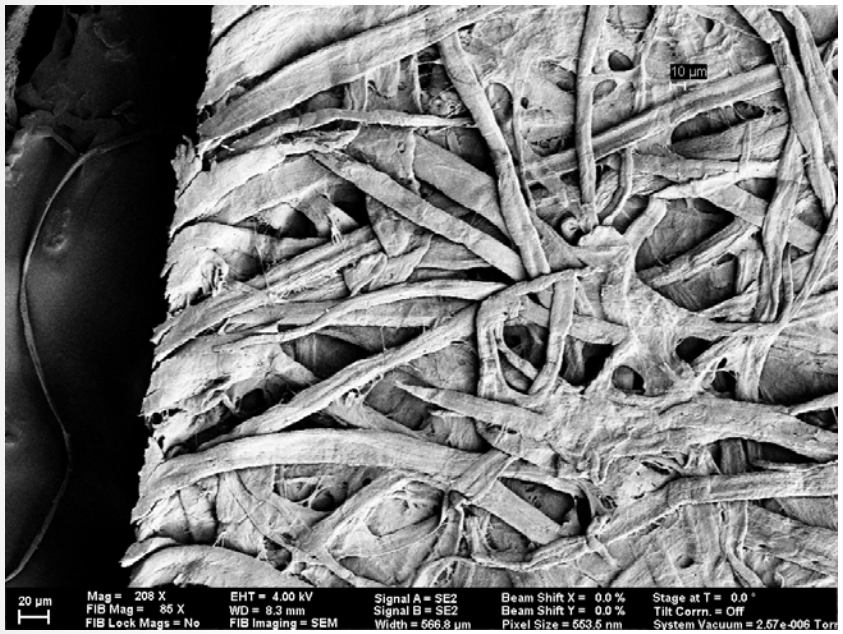
Since August 2012

- CNF - 4,612 lbs., dry basis
- CNC – 210 lbs., dry basis

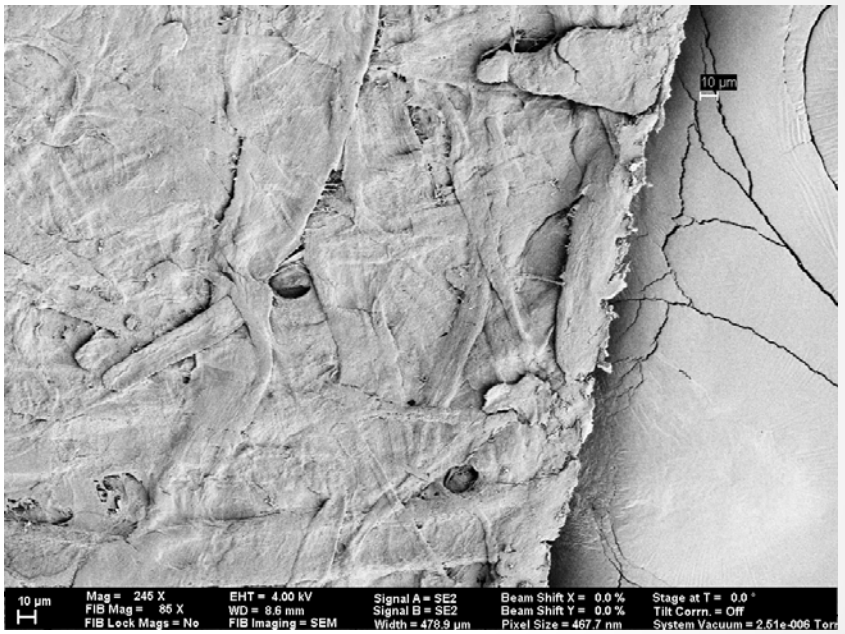
- 162 Entities – 28 Countries
  - 102 Private Companies
  - 60 Universities/Government Labs

Commercial Scale-up

Release Base Paper Surface



Control – 208 X

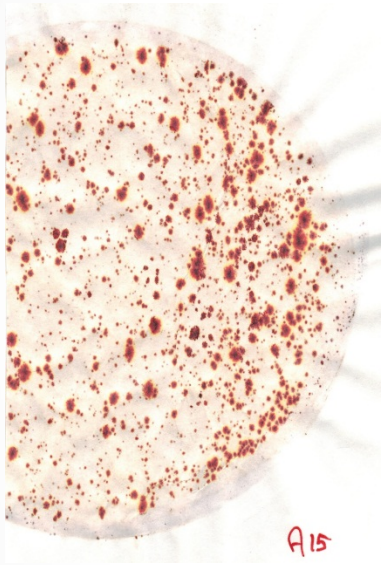


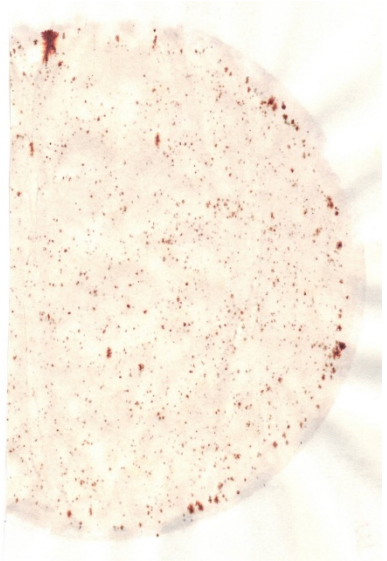
CN 200 – 245 X

5% CNF added

Stain Results

Silicone Coated Release Base





A. Control Base

B. CN 200 Base

Pilot paper machine samples

5% CNF

Challenges and Opportunities in Manufacturing

- Turn-key production equipment
- Cost effective dewatering process
- Compatibility with hydrophobic matrices
- Metrology

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