

# Valorization of side-products from biorefineries by integration of colloidal lignin particles for environmental applications



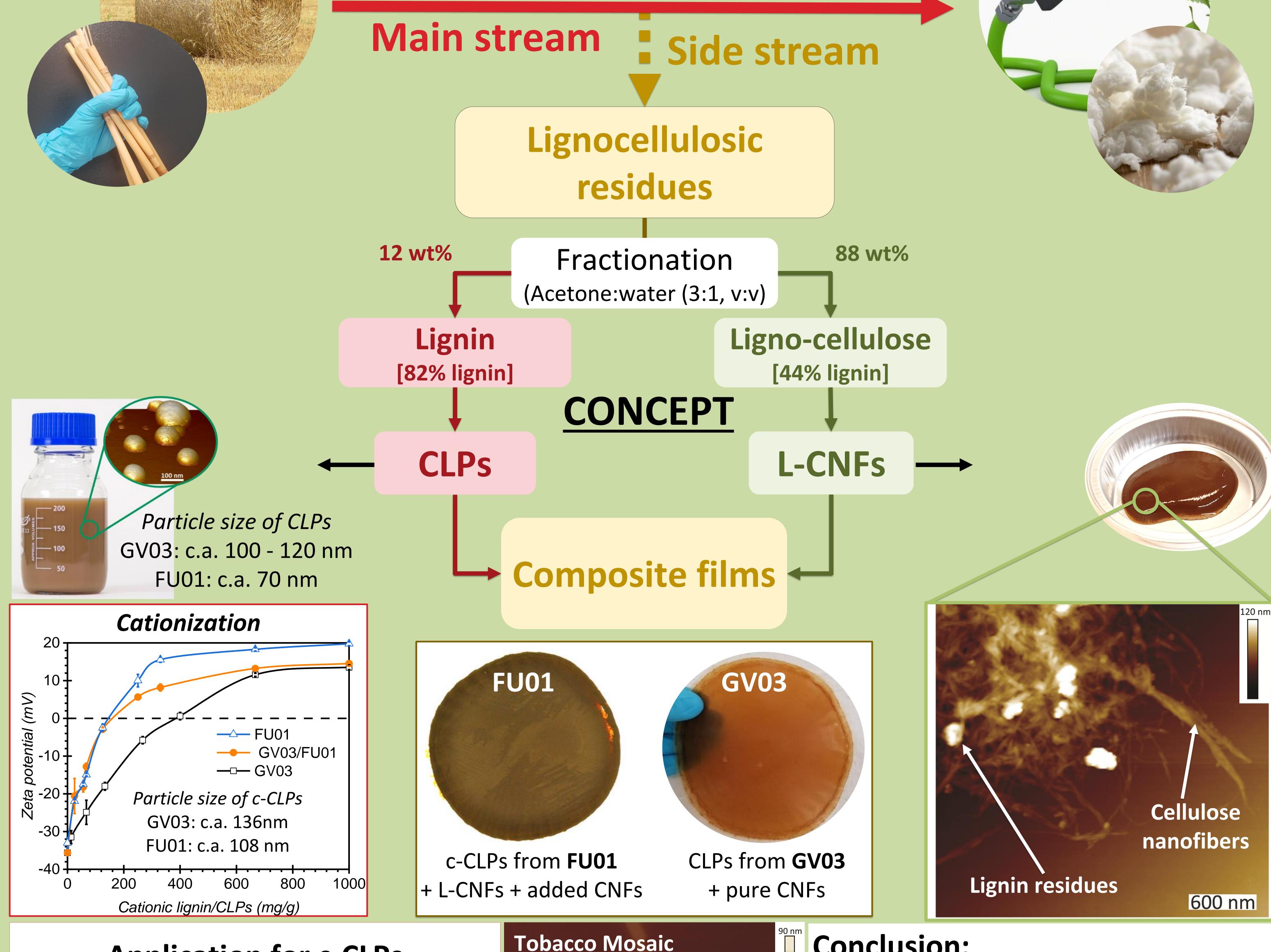
<u>G. Rivière</u>, <sup>1</sup> M. Farooq, <sup>1</sup> F. Pion, <sup>2</sup> M. Sipponen,<sup>1, 3</sup> H. Koivula, <sup>4</sup> M. Kostiainen, <sup>1</sup> S. Baumberger, <sup>2</sup> and M. Österberg. <sup>1</sup>

1. Aalto University, Department of Bioproducts and Biosystems, Vuorimiehentie 1, 02150 Espoo, Finland. 2. Institut Jean-Pierre Bourgin, INRA, AgroParisTech, CNRS, Université Paris-Saclay, 78000 Versailles, France. 3. Stockholm University, Department of Materials and Environmental Chemistry, Svante Arrhenius väg 16 C, 106 91 Stockholm, Sweden. 4. University of Helsinki, Department of Food and Nutrition, Agnes Sjöbergin katu 2, 00790 Helsinki, Finland.

**Background:** Lignocellulosic residues with high lignin content (as in GV03 with 89% lignin) can be directly valorized by transformation into colloidal lignin particles (CLPs). However, heterogeneous composition induces low CLP production (as in FU01, with 55% lignin).



**Objective:** Efficient use of the lignocellulosic residues from biorefinery (Futurol) following a zero-waste approach.



# **Application for c-CLPs**

**Tobacco Mosaic** Viruses (TMVs)

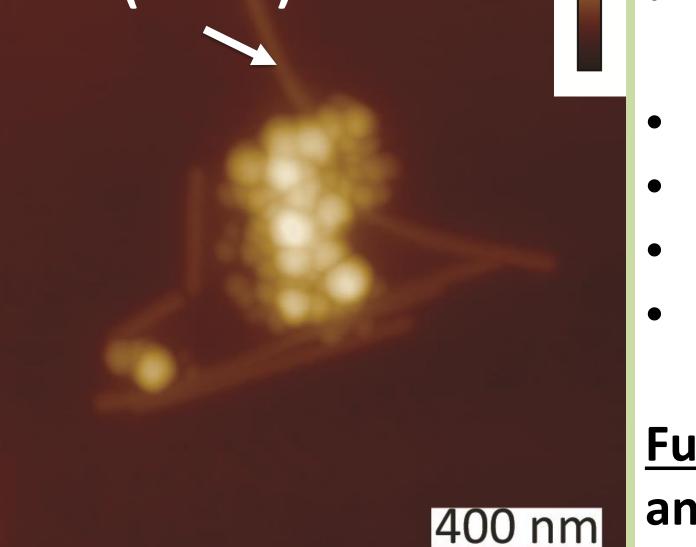
**Conclusion:** 

Fractionation of FU01 provides 3 types of materials (CLPs, L-CNFs and composite films) Zero-waste approach

### Virus removal for water purification

#### 1.6 (c-CLP) : 1 (TMV)

#### 70% removal with FU01 by filtration vs. 41% with GV03 at the same conc.



- **Smaller CLPs and c-CLPs**
- **Higher cationic charge**
- **Higher virus removal rate**

**Future work: Further studies for L-CNFs as coating** and for films for packaging





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