Clean Energy and Sustainability Symposium: Australia-Brazil

Biomass applications in terms of biorefinery and nanotechnology

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Info: http://lcnano.ufpr.br
htpp://gnanoagro.ufpr.br

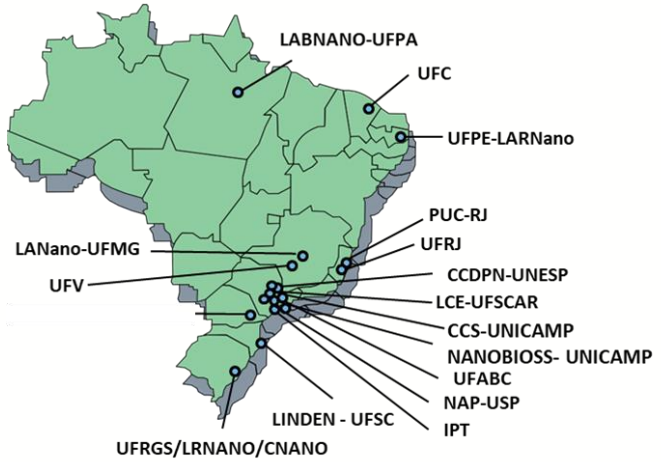
SISNANO network (National System of Laboratories in Nanotechnology)

LCNano / UFPR

Laboratory associated to SisNANO Network
(Coordination: Profª Graciela I B de Muniz and Profª Lucimara Roman

LCNano-UFPR is in the city of Curitiba (Paraná State), Southern Brazil

Labs Associados

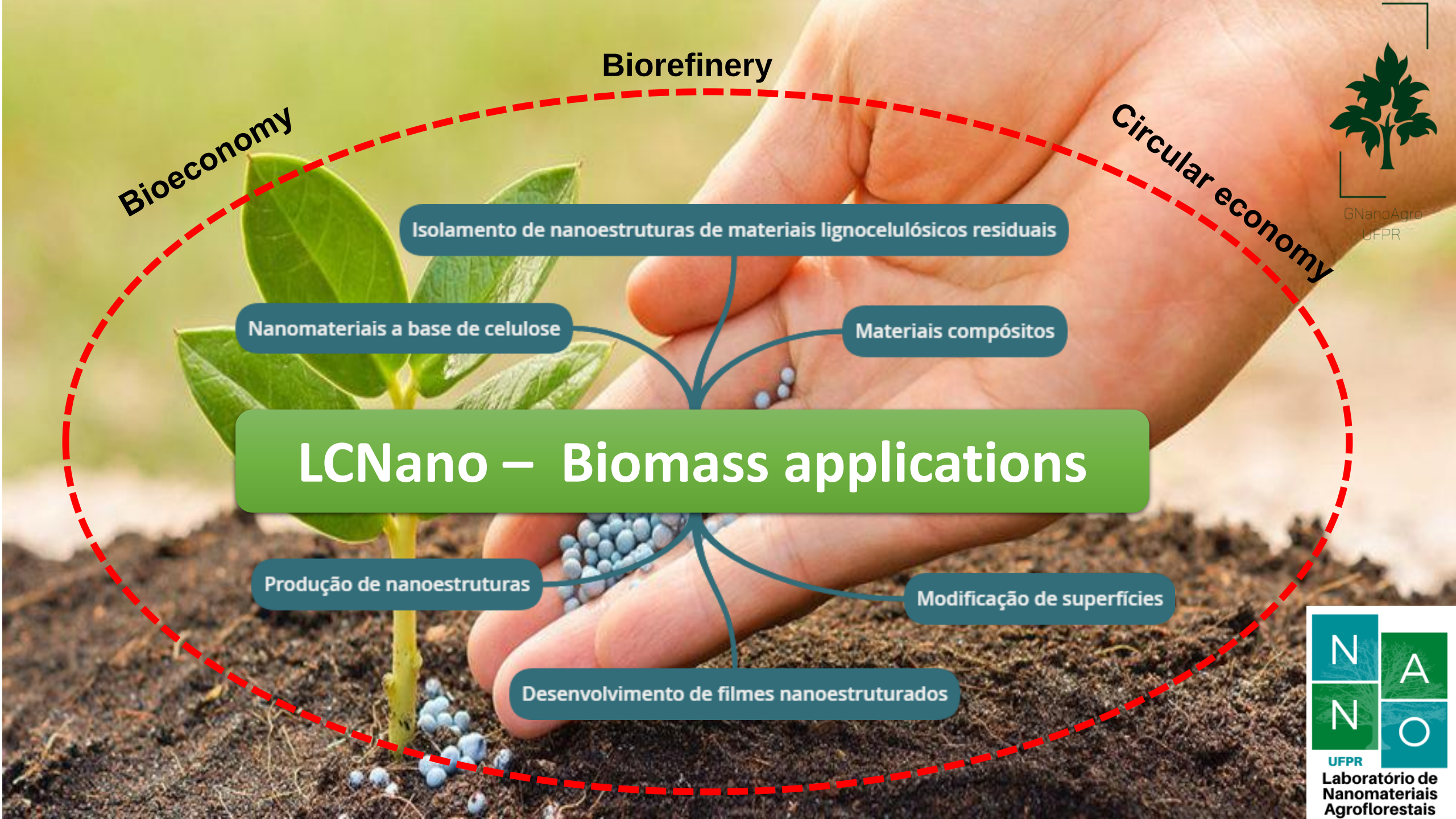


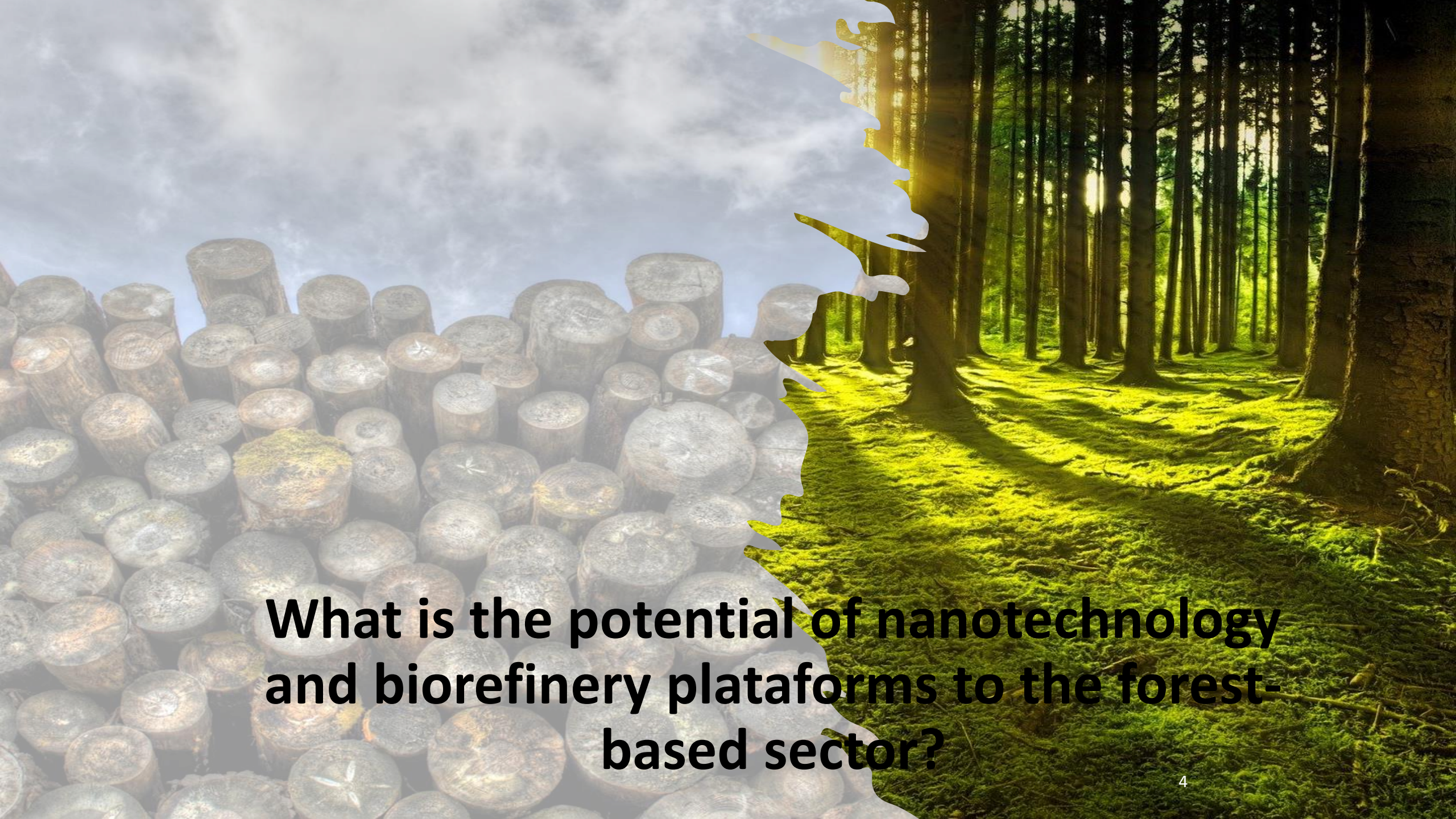
GNanoAgro
UFPR

GNanoAgro-UFPR
Agroforestry Nanotechnology Group

UFPR
Laboratório de Nanomateriais Agroflorestais

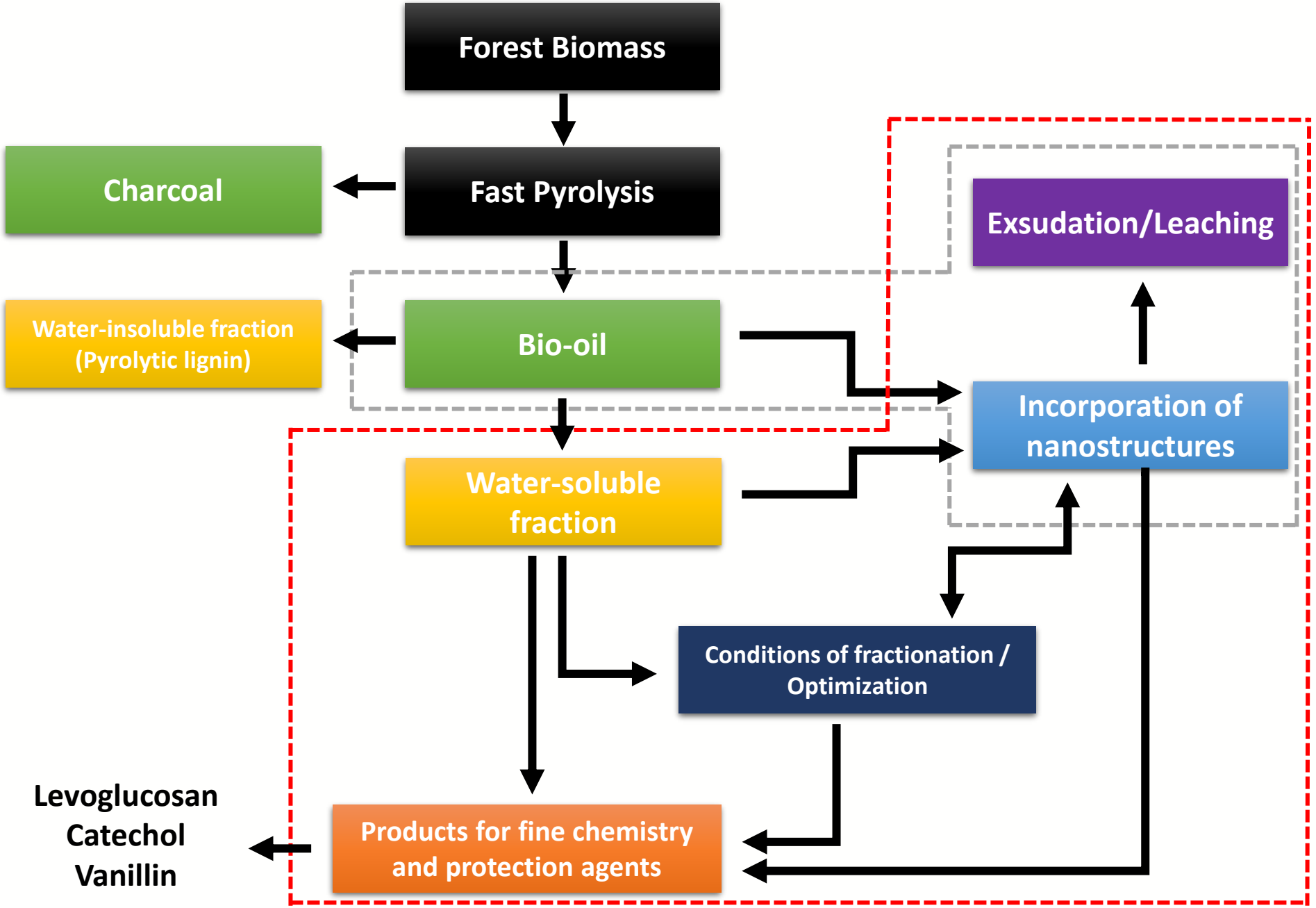
Laboratory of AgroForestry Nanomaterials


Biorefinery
Bioeconomy
Circular economy
Isolamento de nanoestruturas de materiais lignocelulósicos residuais
Nanomateriais a base de celulose
Materiais compósitos
LCNano – Biomass applications
Produção de nanoestruturas
Modificação de superfícies
Desenvolvimento de filmes nanoestruturados
GNanoAgro
UFPR
UFPR
Laboratório de Nanomateriais Agroflorestais



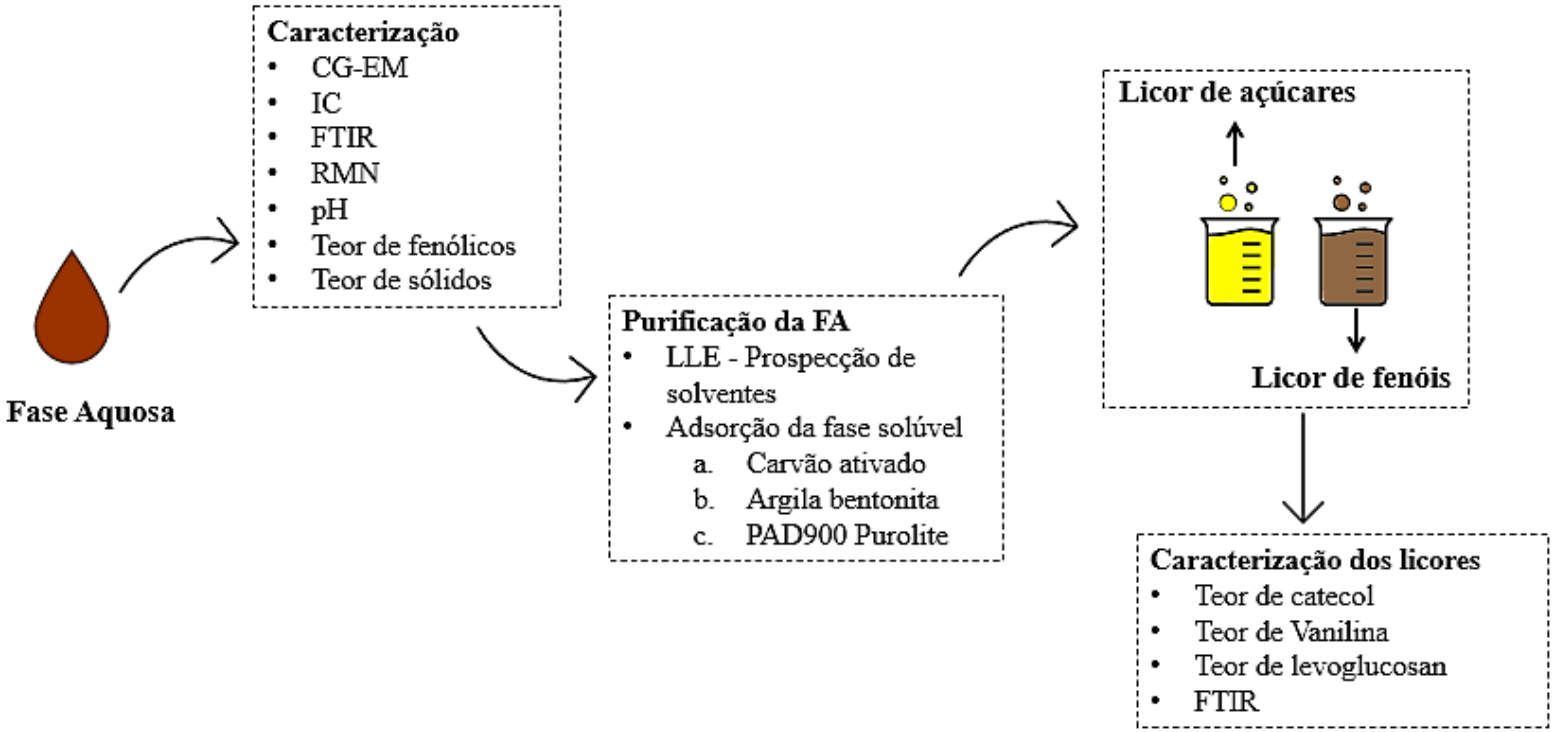
What is the potential of nanotechnology and biorefinery plataforms to the forest-based sector?

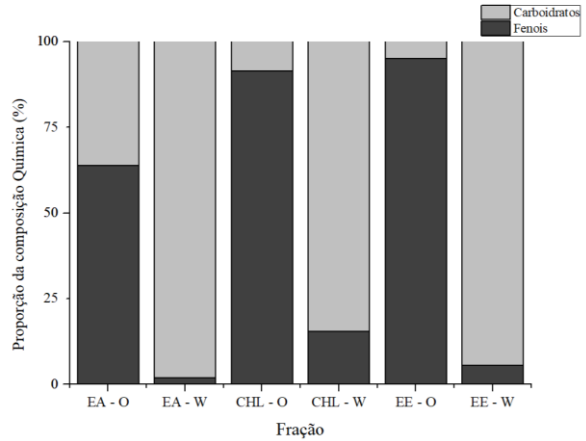
Fast-pyrolysis bio-oil→ High-added value products

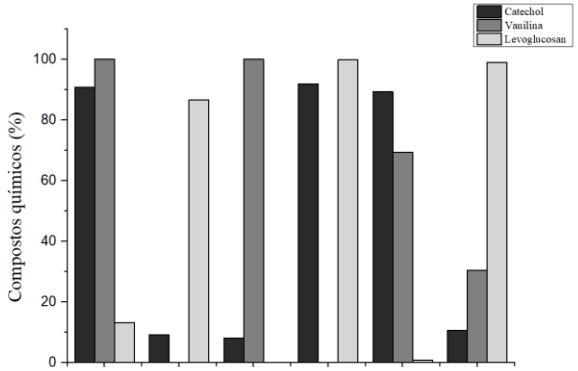


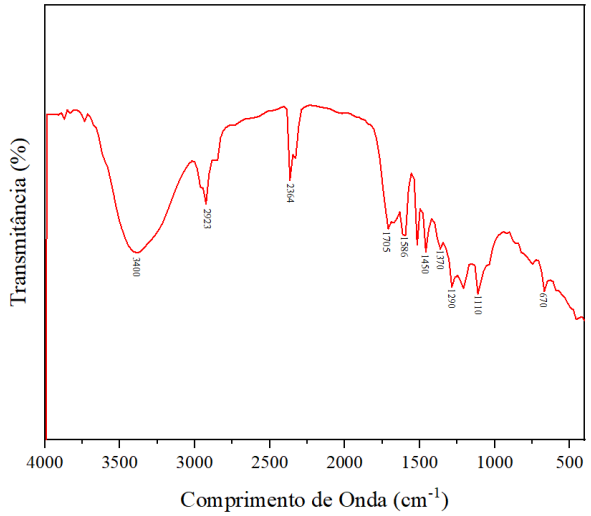
Funding
CNPq
Fundação Araucária
Suzano S.A.

Process optimization for efficient extraction of catechol, vanillin, and levoglucosan: towards valorization of fast pyrolysis bio-oil in a biorefinery platform.









Project CNPq MAI/DAI – Bio-oil fractionation

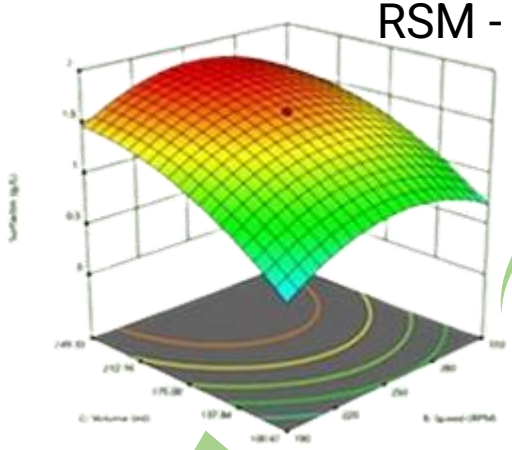
Funding: Suzano S.A. and CNPq

The precipitation of catechol and vanillin is feasible using the adopted methodology.

Catechol precipitates under more extreme conditions (-32°C), while vanillin exhibits greater simplicity in the process (8°C).

Project CNPq MAI/DAI – Bio-oil fractionation
Funding: Suzano S.A. and CNPq

RSM - Process parameter optimization



Kraft Lignin +EDA
(Ethylenediamine)

Pyrolitic Lignin

Hydrothermal Method

270°C

10 h

220°C

12 h

Sun Light

UV Light
(360 nm)

Yield = ±50% wt
Quantum Yield = ± 12%

Sun Light

UV Light
(360 nm)

Yield = ±63% wt
Quantum Yield = ± 7,3%

Project – Lignin-based Carbon dots

- Carbon dots were produced from kraft lignin with a quantum yield between 10-12%.
- The final product yielded between 55-60% by mass.
- The response surface study enabled verification of which parameters influence the quantum yield.
- The adopted production method is well-established with initial scaling potential for carbon dots production.
- Solid by-products indicate modification, expanding their range of applications.

Project – Lignin-based Carbon dots

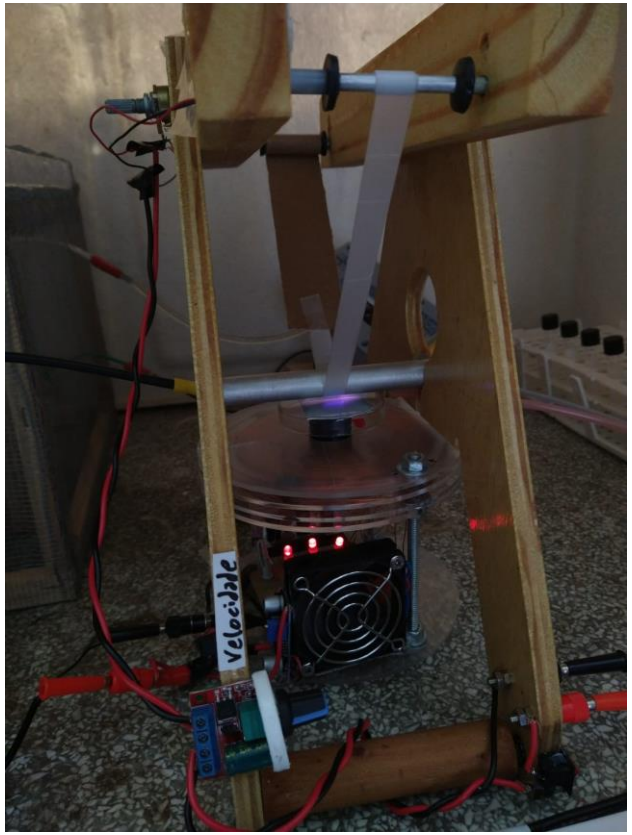
Plasma treatment in liquid media
Prototype – Under construction

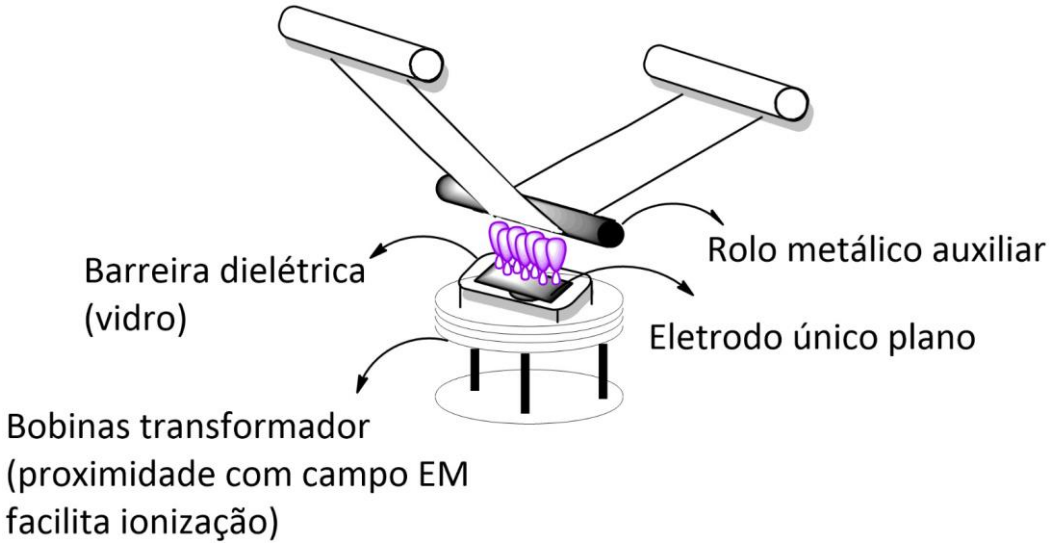
DBD discharge for membranes

Activation and functionalization of paper to improve the surface adhesion and develop news materials.

Functionalization of liquid media to improve the free radicals / surface oxidation and develop news materials.

Project – Plasma / Paper / Nanocellulose
Funding: Suzano S.A. and CNPq





Roll-to-roll Prototype – Under construction

Activation and functionalization of paper to improve the surface adhesion and develop news materials.

Prototypes able to scale up the technology.

Project – Plasma / Paper / Nanocellulose

Funding: WestRock and CNPq

Collaborations and funding

We are able to new collaborations!

Thank you for your attention!

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