COMUNICAÇÃO TÉCNICA

Nº 180220

Influence of iron-eneriched bed materials on fast pyrolysis of sugarcane bagasse insights from bio-oil and biochar properties

Denis Correa Meyer
Vittor Rodrigues Santos Alves
Ana Paula de Souza Silva
Danilo Eiji Hirayama
Bruno Alexandre de Lemos
I.Marques

Pôster apresentado no EUROPEAN BIOMASS CONFERENCE & EXHIBITION, 34., The Hague, Netherlands. 1 slides.

9 - 12 May 2022 | Online

INFLUENCE OF IRON-ENRICHED BED MATERIALS ON FAST PYROLYSIS OF SUGARCANE BAGASSE INSIGHTS FROM BIO-OIL AND BIOCHAR PROPERTIES

Meyer, D. C.[1]; Alves, V. R. S.[1]; Silva, A. P. S[1].; Hirayama, D. E.[1]; Lemos, B. A.[1]; Marques, I.[2]

Correspondence author: Denis Correa Meyer, denismeyer@ipt.br

[1]Bioenergy and Energy Efficiency Laboratory (LBE), Energy Unit, Technological Research Institute (IPT)

[2]Petrogal Brasil S.A.

1. INTRODUCTION

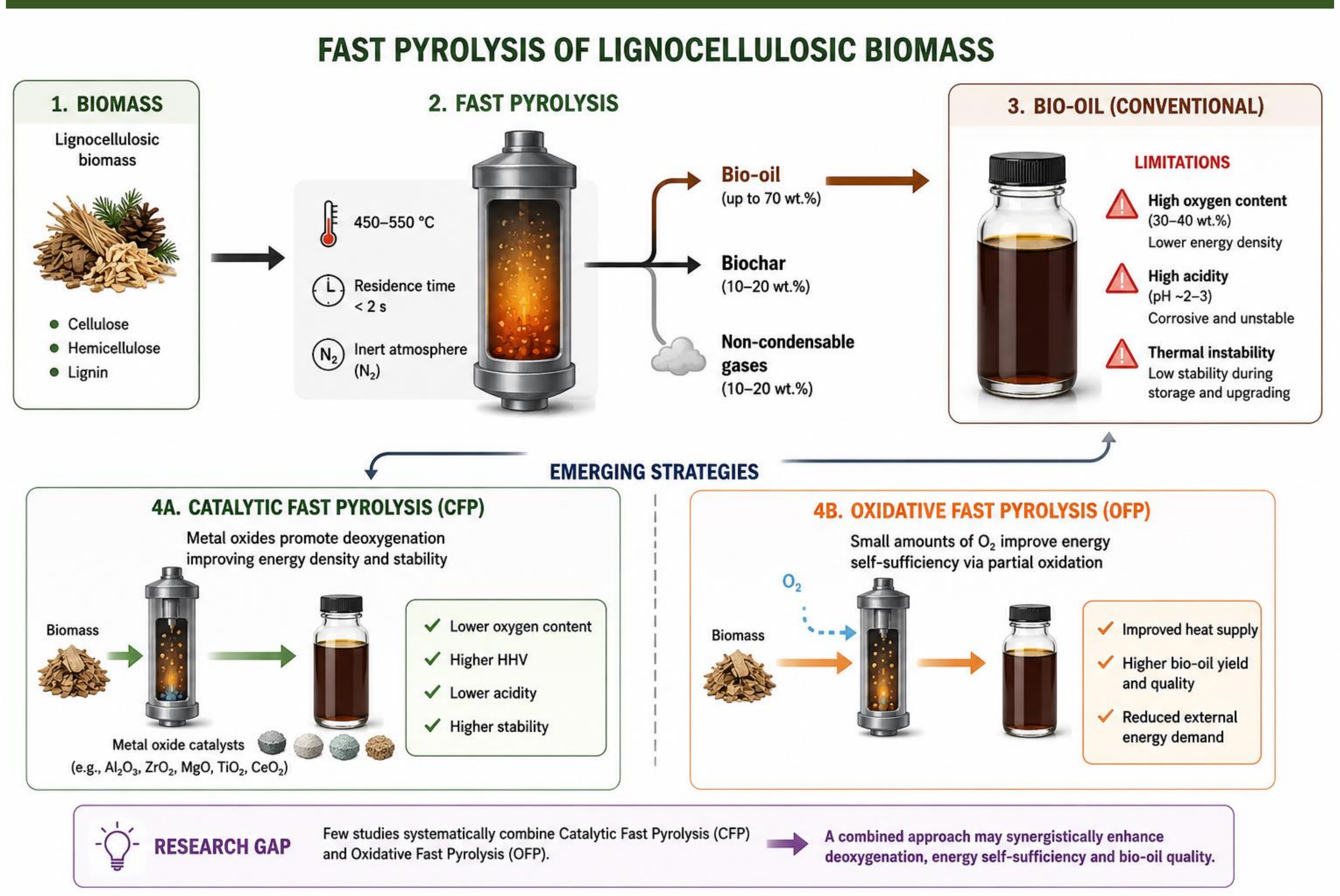

Figure 1 – Schematic diagram for biomass pyrolysis

2. OBJECTIVES

- Evaluate the influence of **catalytic and oxidative conditions** on fast pyrolysis of sugarcane bagasse (SB)
- Compare **five operational modes**:
  - CNC – Conventional (N_2, no catalyst)
  - CC – Catalytic (N_2 + Fe-bed)
  - O5NC – Oxidative 5% O_2 (no catalyst)
  - O10NC – Oxidative 10% O_2 (no catalyst)
  - O5C – Catalytic-Oxidative (5% O_2 + Fe-bed)
- Assess **bio-oil yield and physicochemical properties** under each condition

3. METHODOLOGY

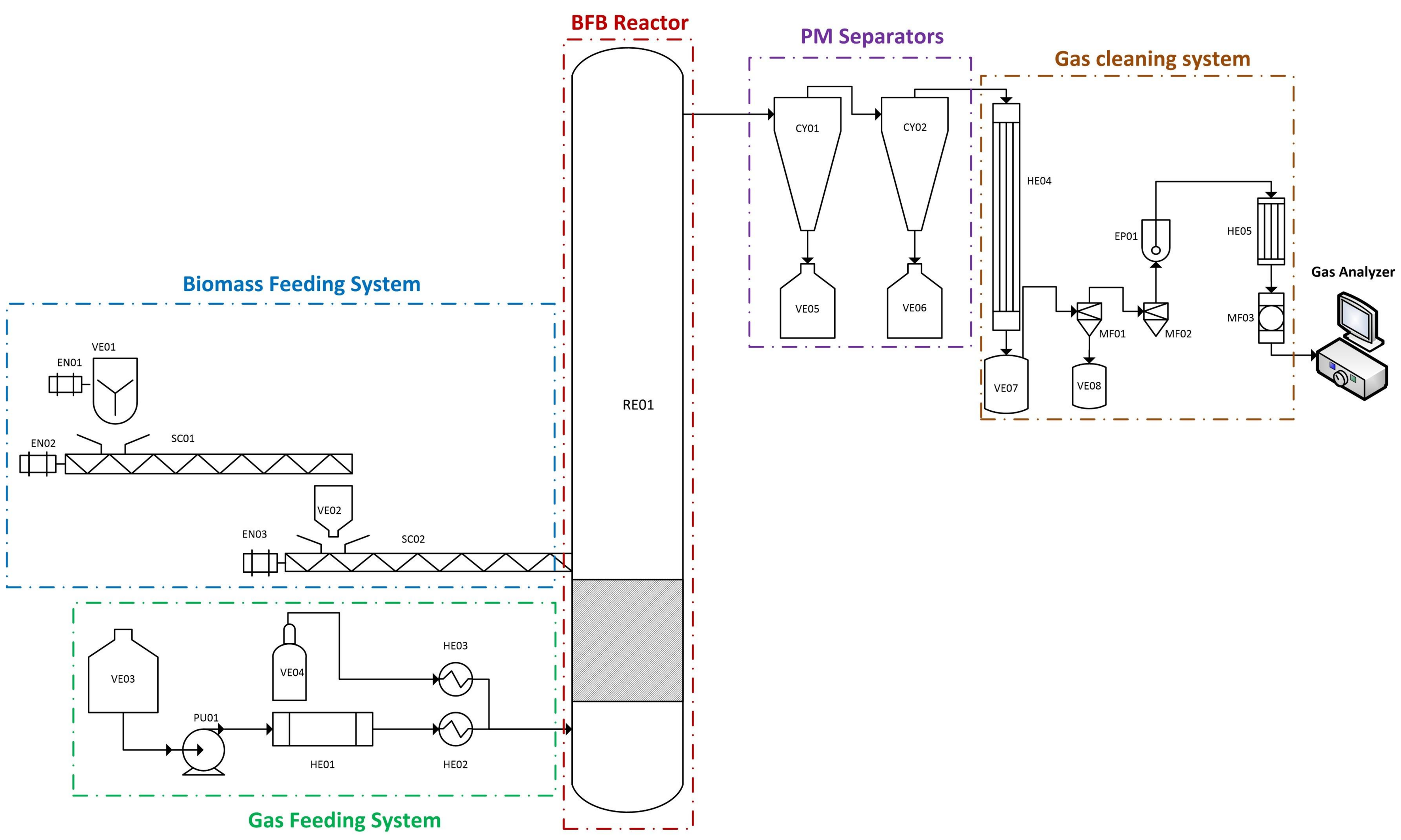

Figure 2 – Bubbling fluidized bed unit for fast pyrolysis

Parameter	Details
Reactor	Continuous fluidized bed (lab-scale, up to 2 $kg \cdot h^{-1}$)
Feedstock	Milled sugarcane bagasse (~0.4 mm)
Temperature	500–550 °C
Catalytic bed	Iron-rich industrial residue (FeO + Fe_3O_4)
Atmospheres	N_2 / N_2+O_2 mixtures (5% and 10% O_2)
Characterization	Elemental analysis (CHNOS), water content, TAN, HHV

Table 1– Process description

4. RESULTS

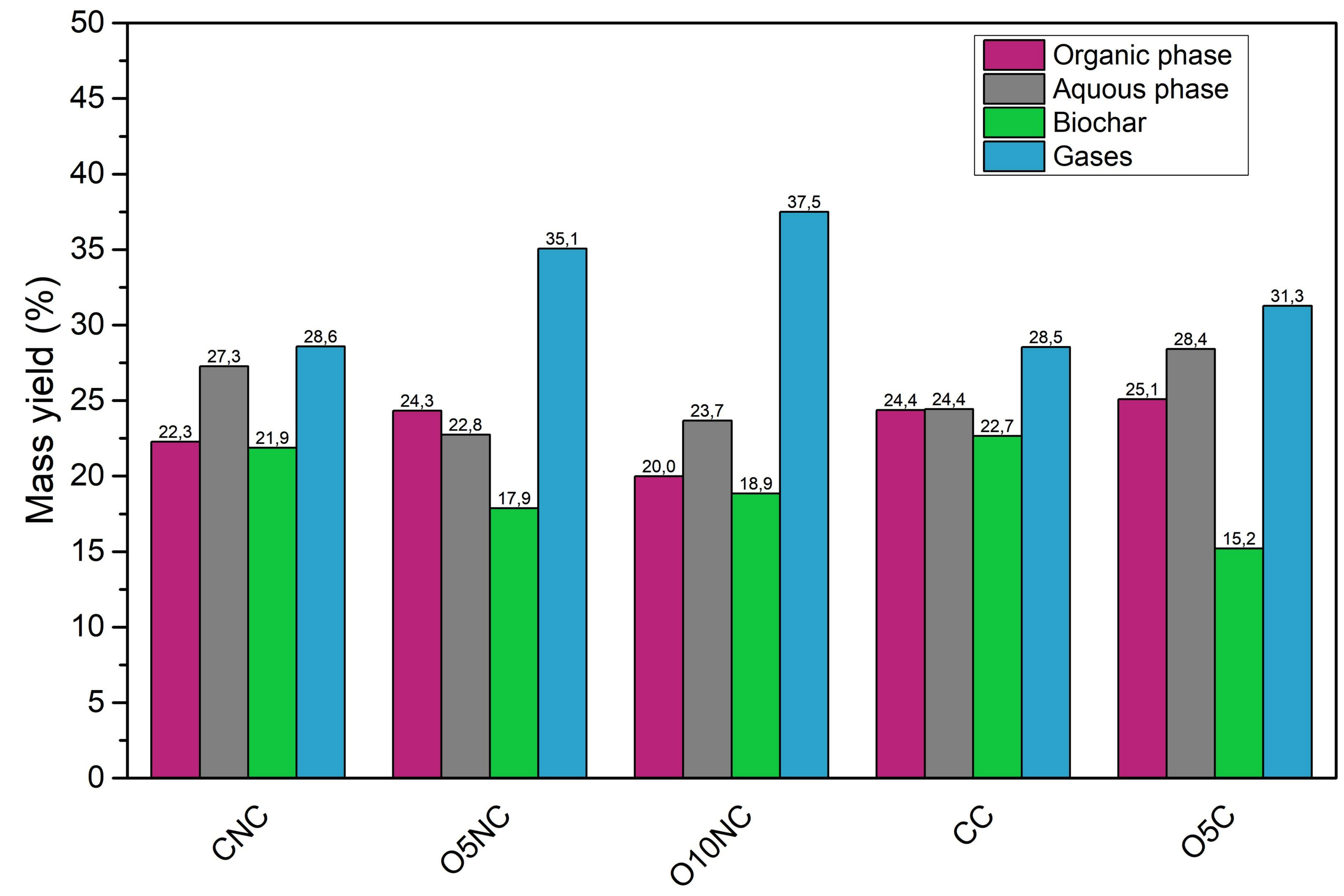

Figure 3 – Mass yields of fast pyrolysis of SB

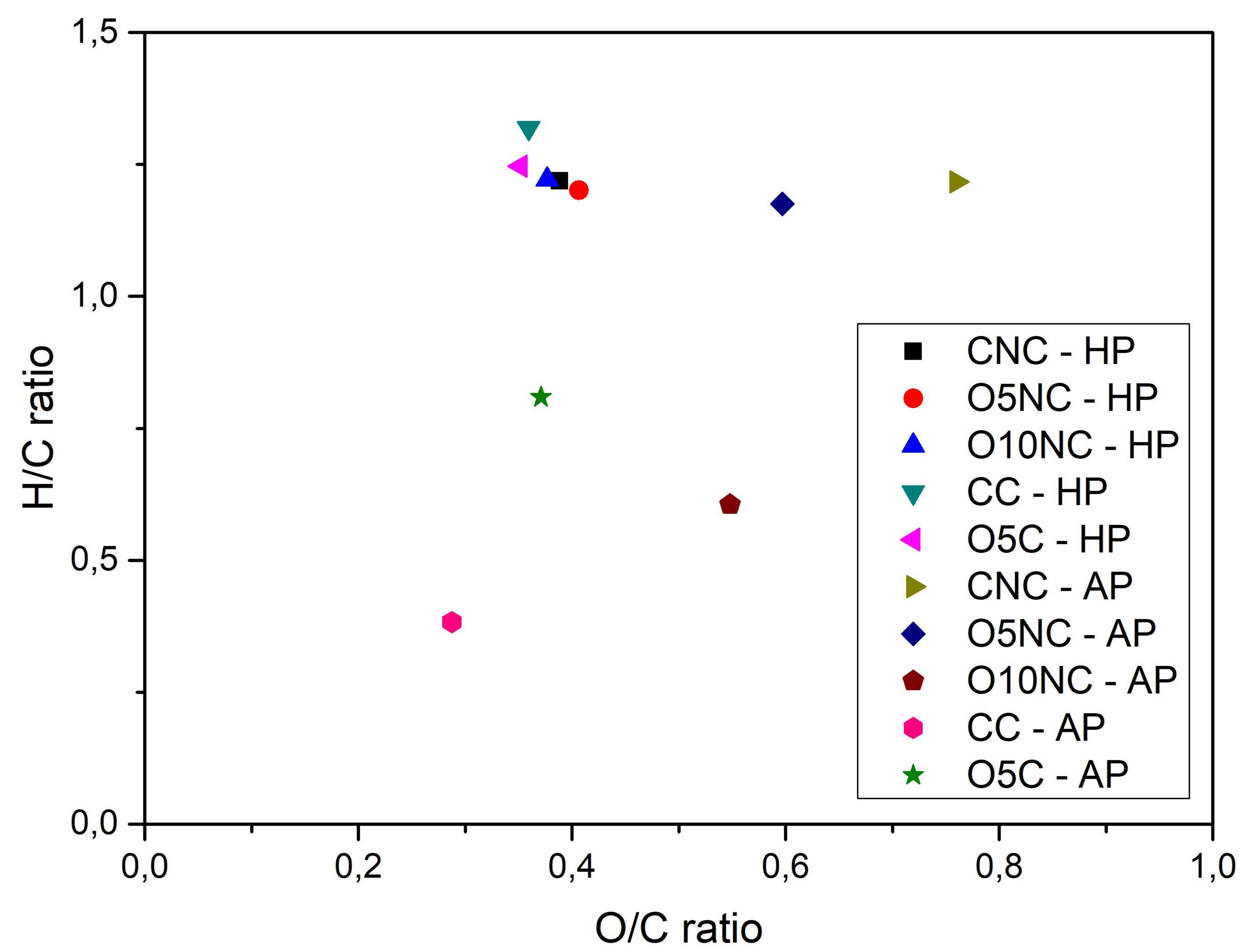

Figure 4 – Van Krevelen diagram for heavy and aqueous phase

Property	CNC	CC	O5NC	O10NC	O5C
Density	1,14	1,16	1,17	1,15	1,15
Acidity (TAN)	65	50	61	52	64
Water Content	17	16	12	16	19
HHV	19,43	21,11	21,12	20,36	19,10

Table 2 – Heavy phase physical properties

5. CONCLUSIONS

- O5C achieved the highest organic bio-oil yield and lowest char formation;
- Catalytic pathways are essential to steer bio-oil composition toward refinery-compatible characteristics
- Trade-offs observed: higher acidity and water content in O5C require further optimization
- Results support the development of integrated catalytic-oxidative pyrolysis systems for industrial bio-oil production

6. ACKNOWLEDGMENTS

Fundação de Apoio ao Instituto de Pesquisas Tecnológicas

Petrogal Brasil S.A. Joint Venture Galp | Sinopec