



PSYCHE

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Onderzoek en innovatie Recherche et innovation

Conversion of Plastic Waste to Base Chemicals via Gasification

Sepehr Madanikashani^{1,3}, Laurien Vandewalle¹, Steven De Meester², Juray De Wilde³, Kevin M. Van Geem^{1*}

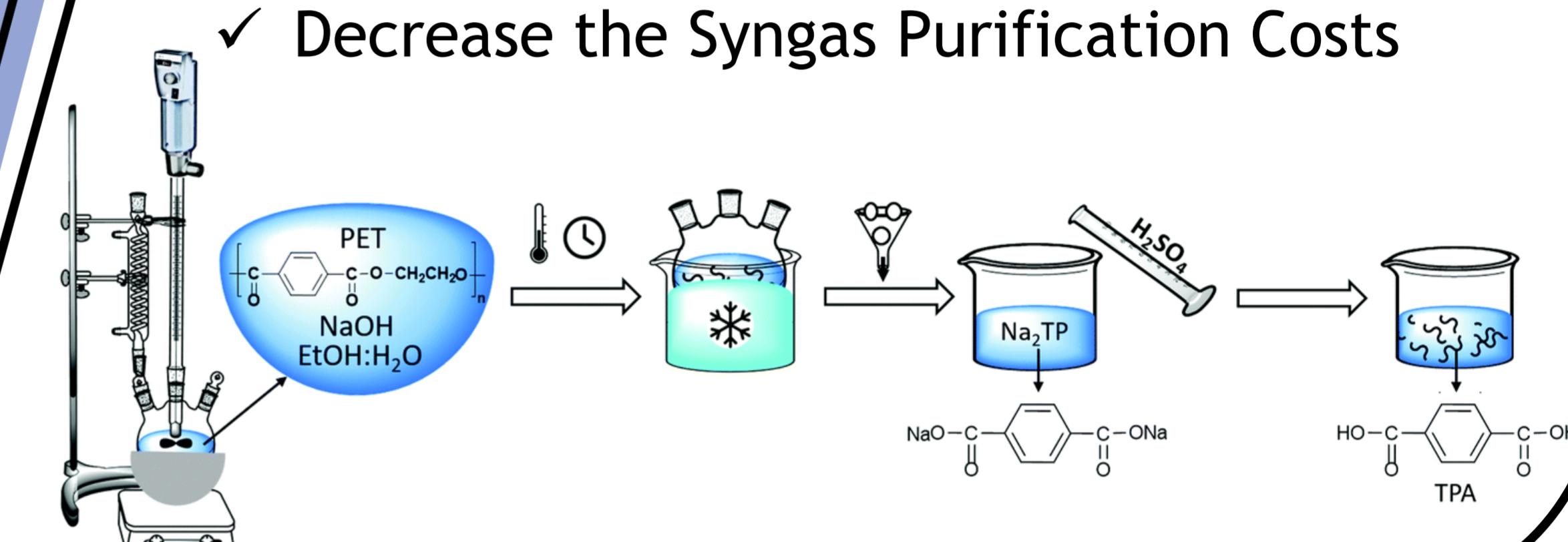
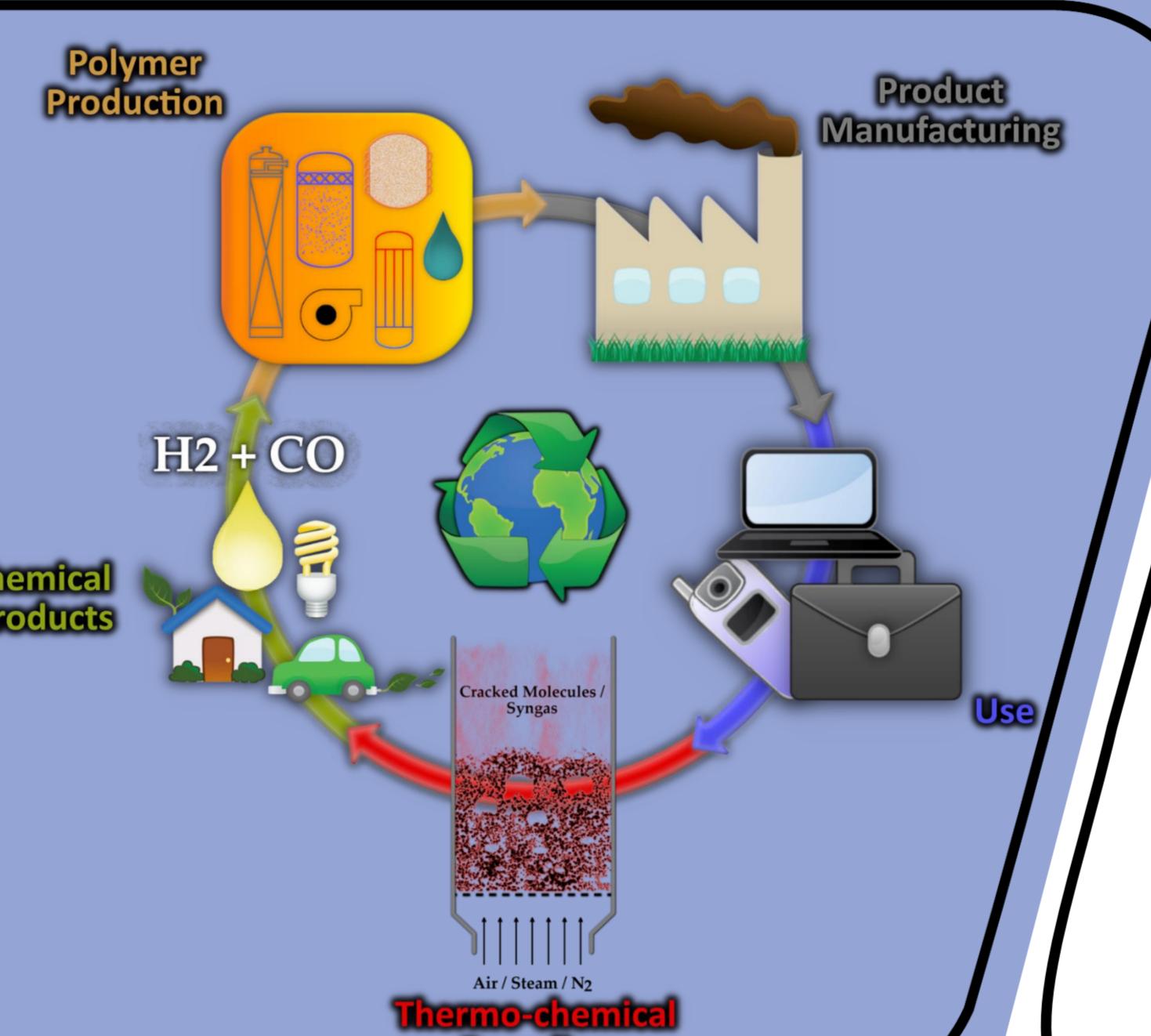
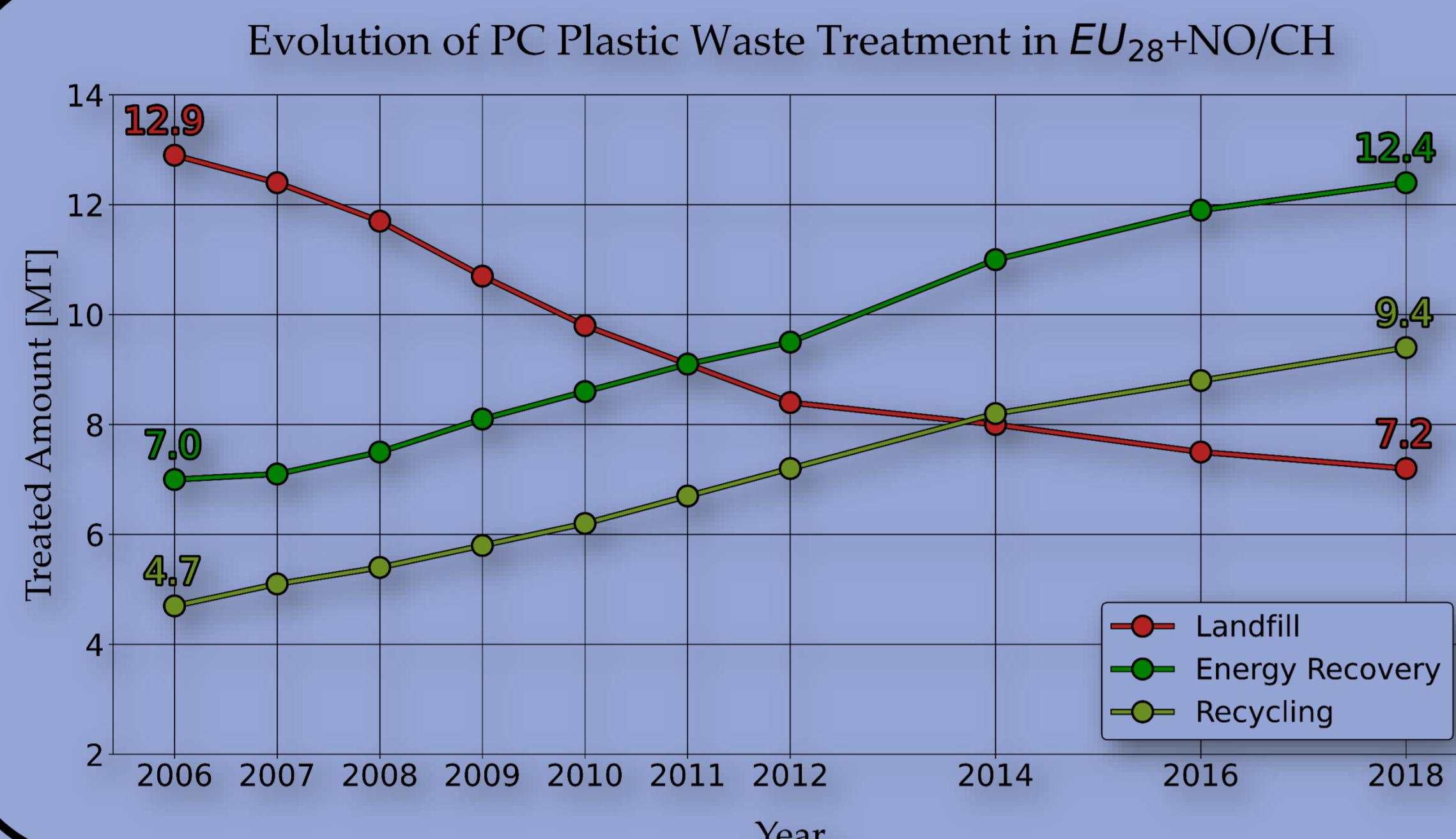
¹Laboratory for Chemical Technology, Gent University

²Laboratory for Circular Process Engineering, Gent University

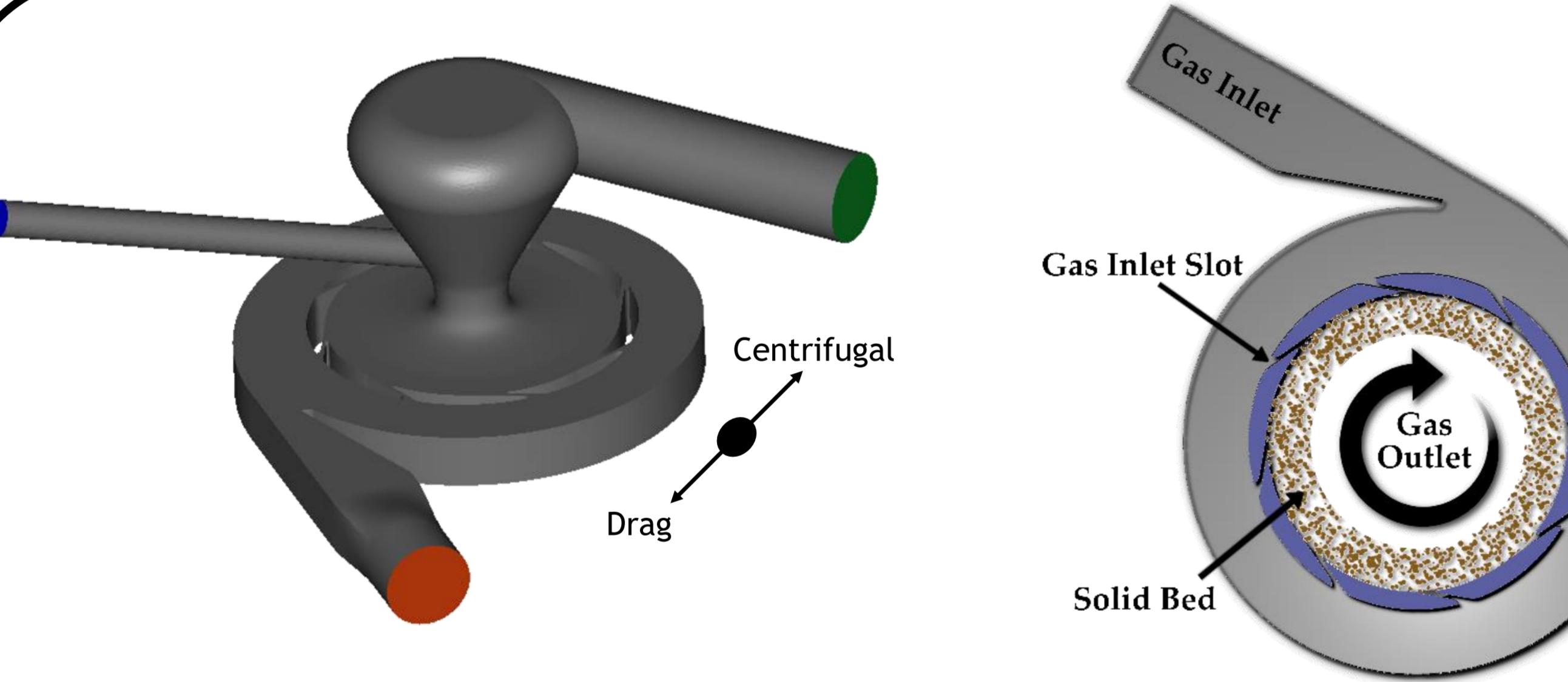
³Materials and Process Engineering, Institute of Mechanics, Materials and Civil Engineering, Université Catholique de Louvain

*Kevin.VanGeem@UGent.be

Introduction



Vortex Reactor

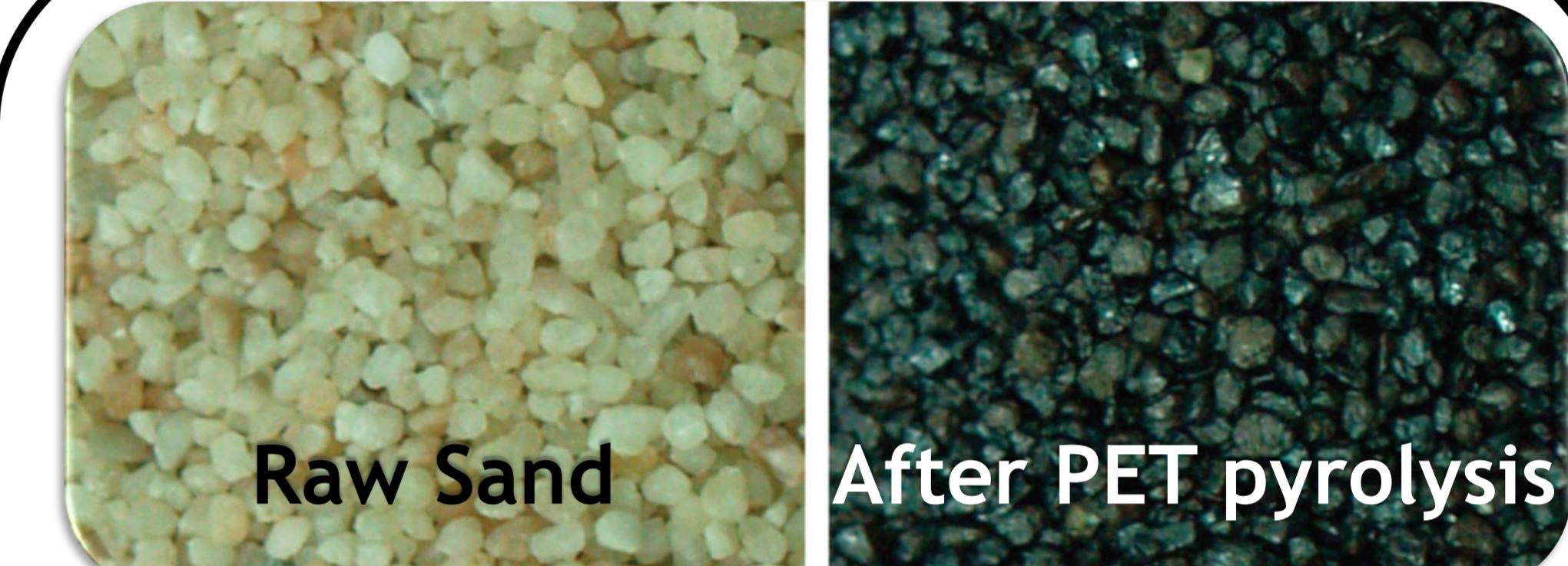


- ✓ Extended gas velocity limitations
- ✓ High slip velocity

- ✓ Packed bed
- ✓ Short gas space time

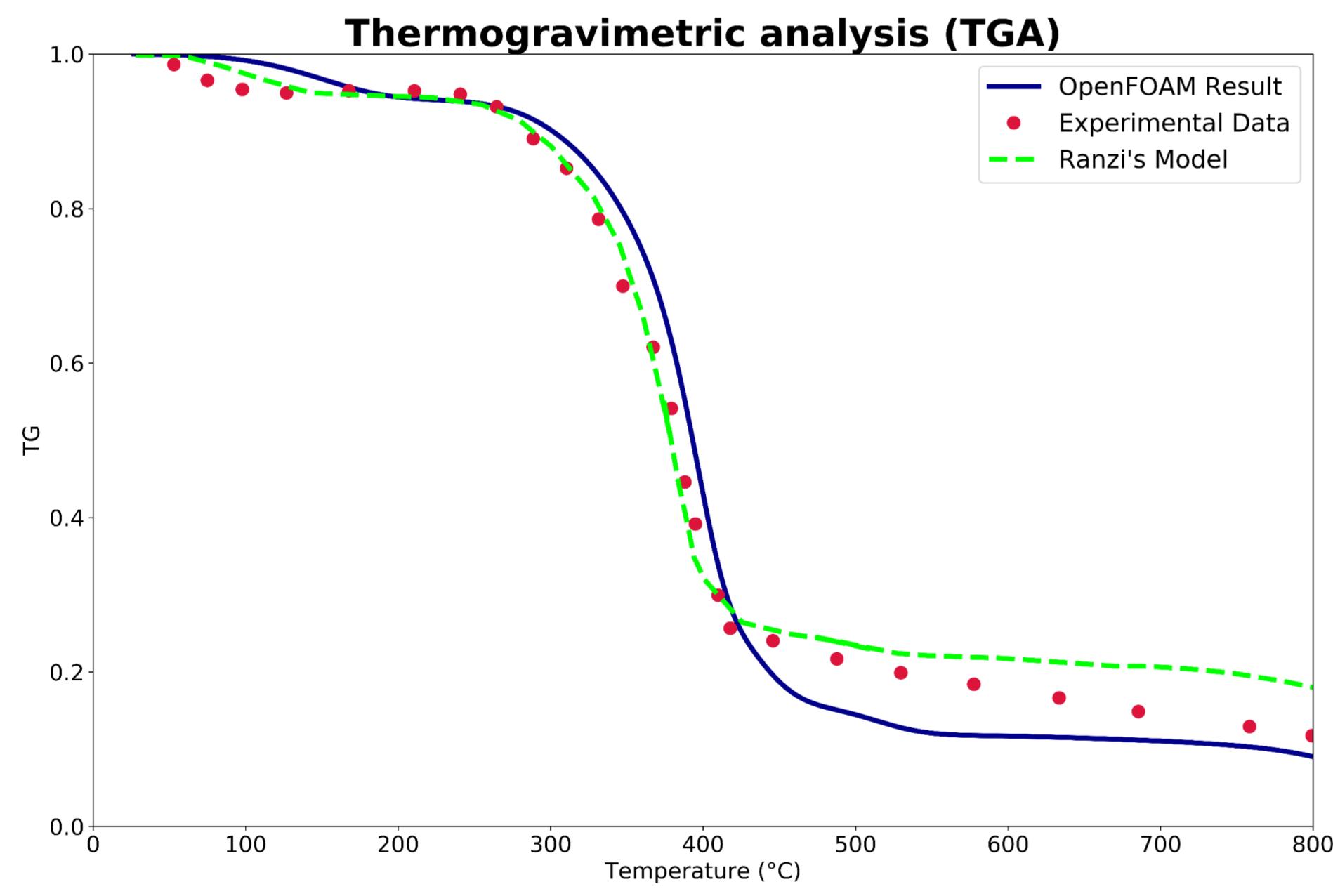
- ✓ 8 slots, 1 mm width, 10° Slope
- ✓ D = 80 mm, H = 15 mm

Plastic Vs. Biomass



- ✓ Reliable global kinetic model
- ✓ Similarity to plastics
- ✓ High velocity and recirculation
- ✓ Molten plastic injection
- ✓ Covering the solid particles

Biomass Fast Pyrolysis 1D Simulations

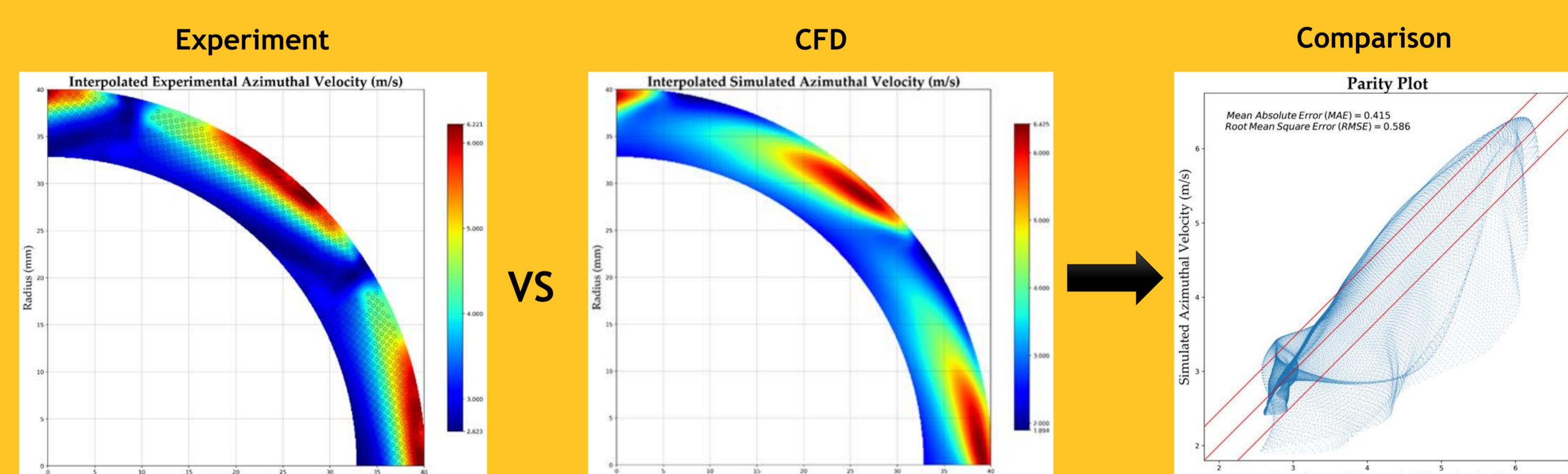


- ✓ OpenFOAM Simulation (E-E Solver)
- ✓ Solid-phase Global Mechanism: Ranzi et al. (29 R, 54 S)
- ✓ Validation case: TGA graph of Pinus Radiata

References

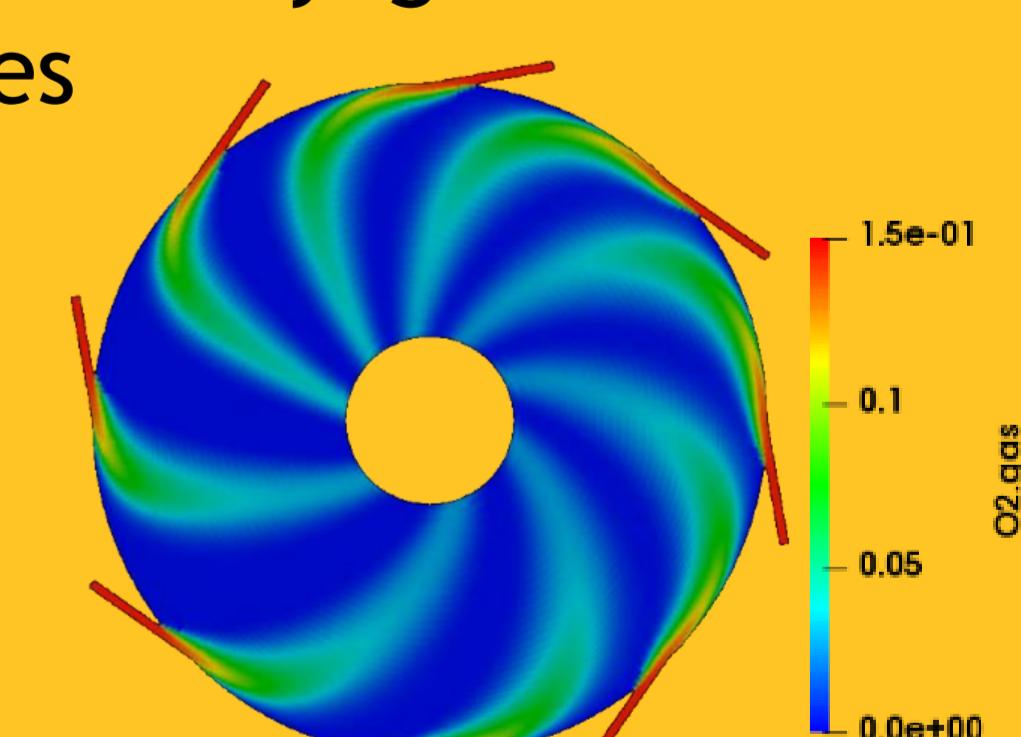
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CFD Vs. Experimental



Conclusion and Future work

- ✓ Compact and scalable process for the conversion of different streams of plastic waste into syngas and chemicals is possible. This includes pre-treatment, gasification, syngas purification, and Fischer-Tropsch synthesis.
- ✓ Reactive Simulations in 2D



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