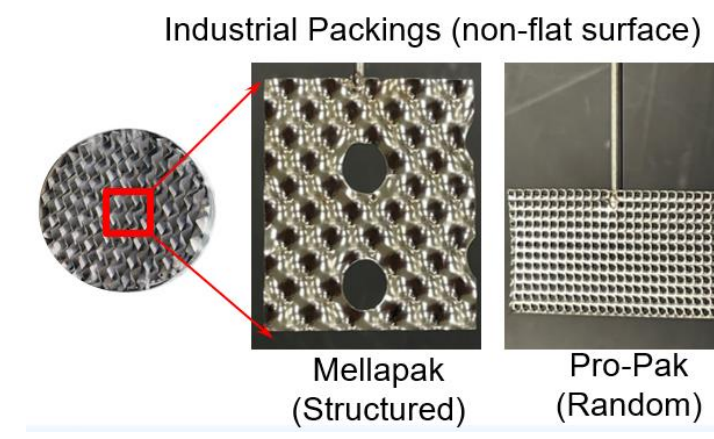
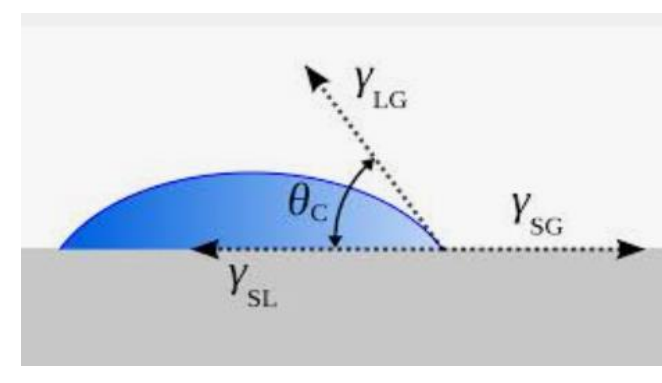
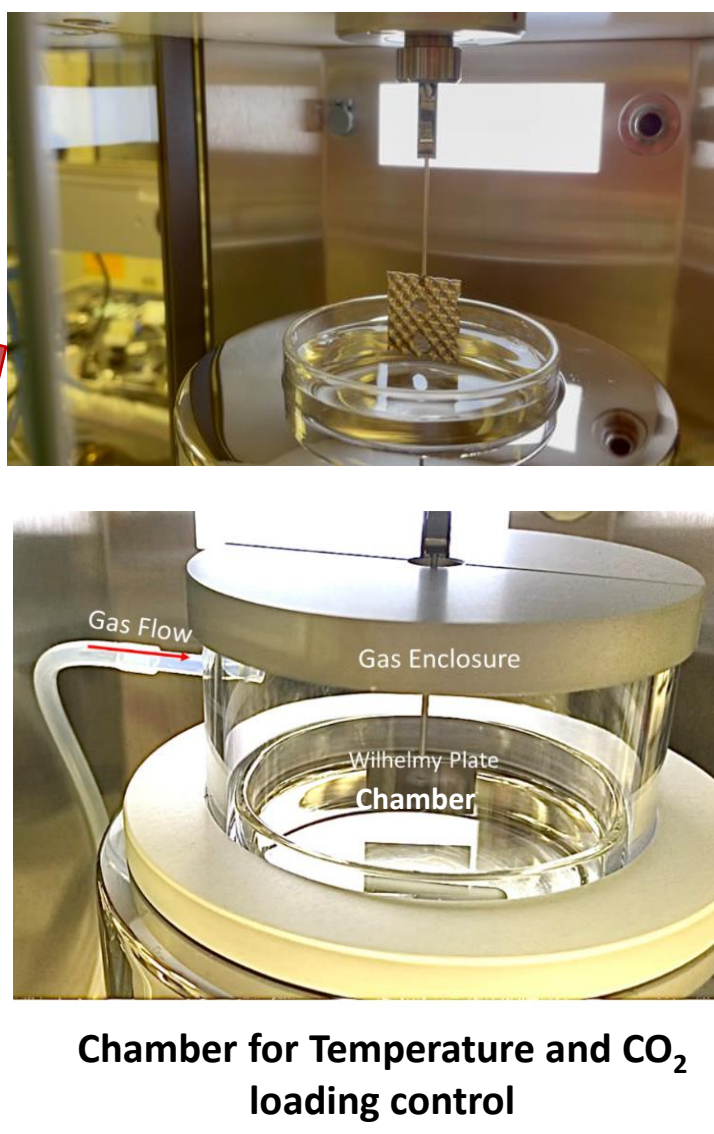
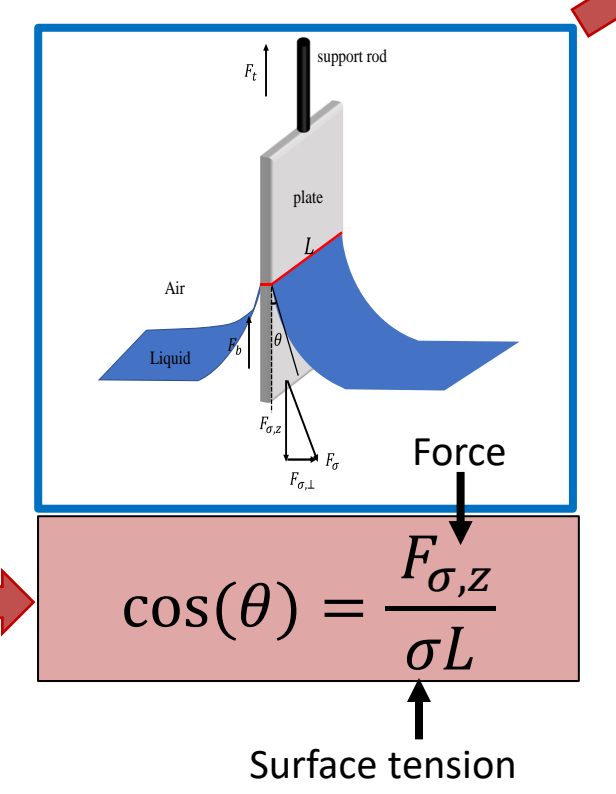
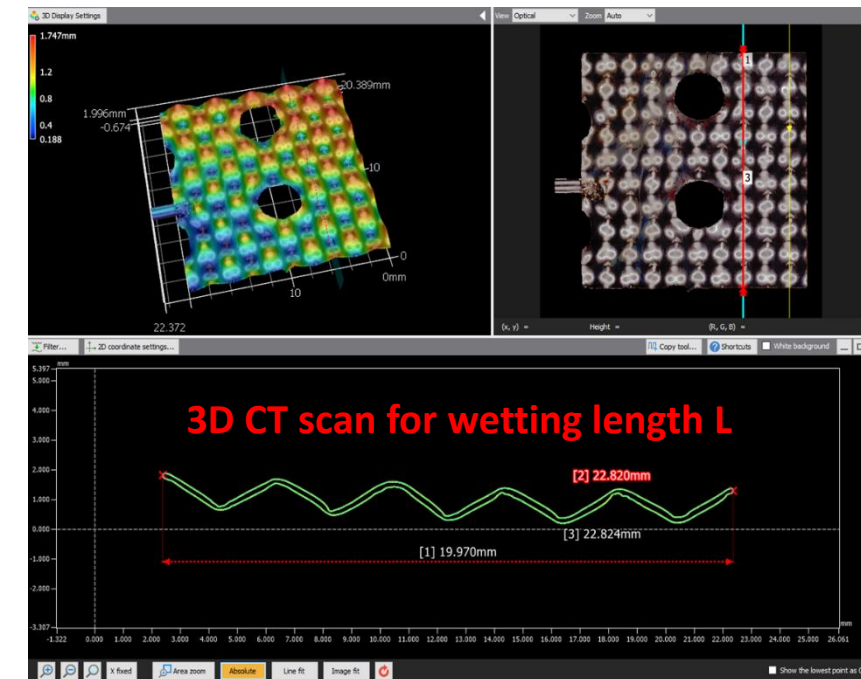


(a) Experiment Characterization: Solvent/Packing Interaction

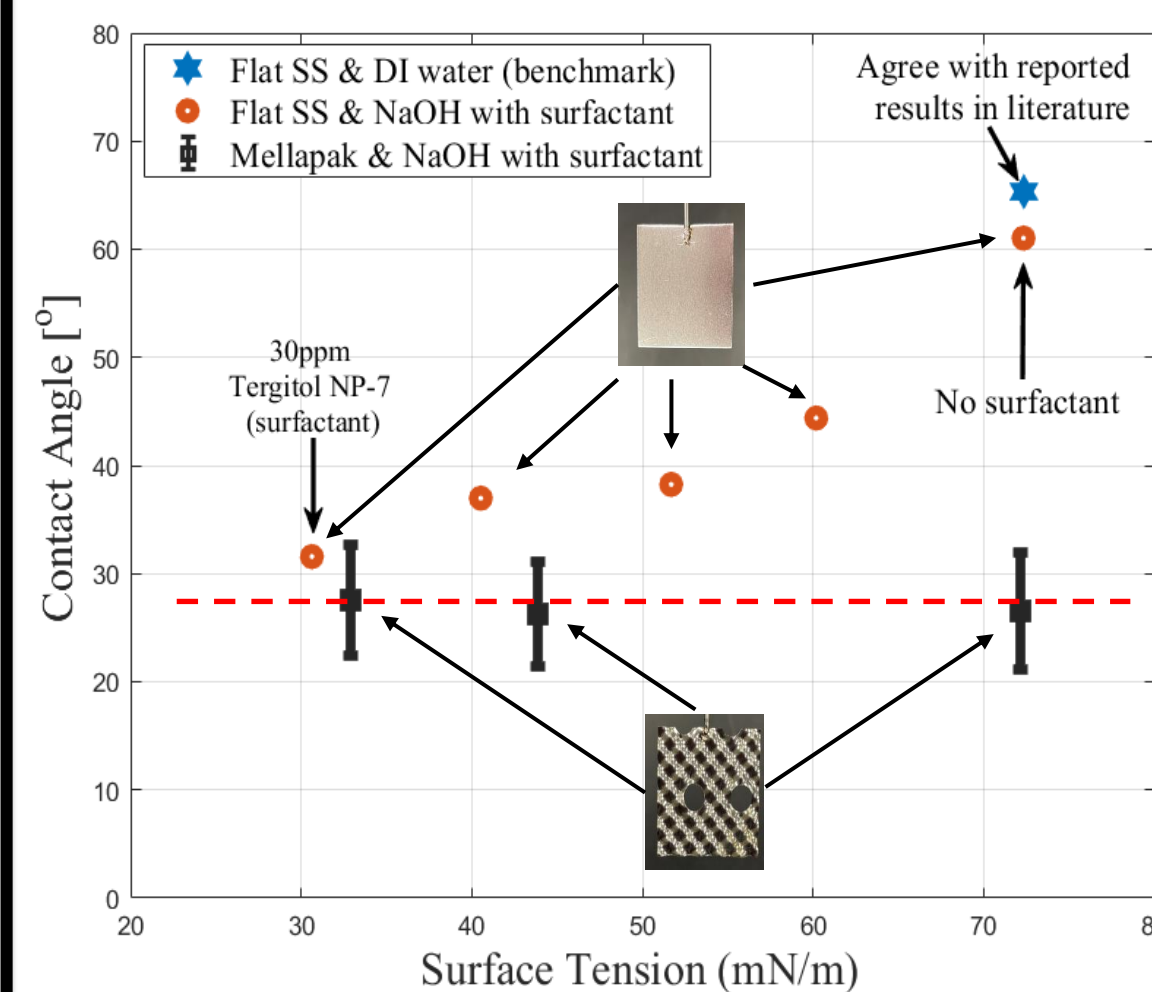
- Traditional method: sessile drop
 - Static measurement
 - Only good for flat surface
 - Not easy for temperature & loading control
 - Not perfect for carbon capture



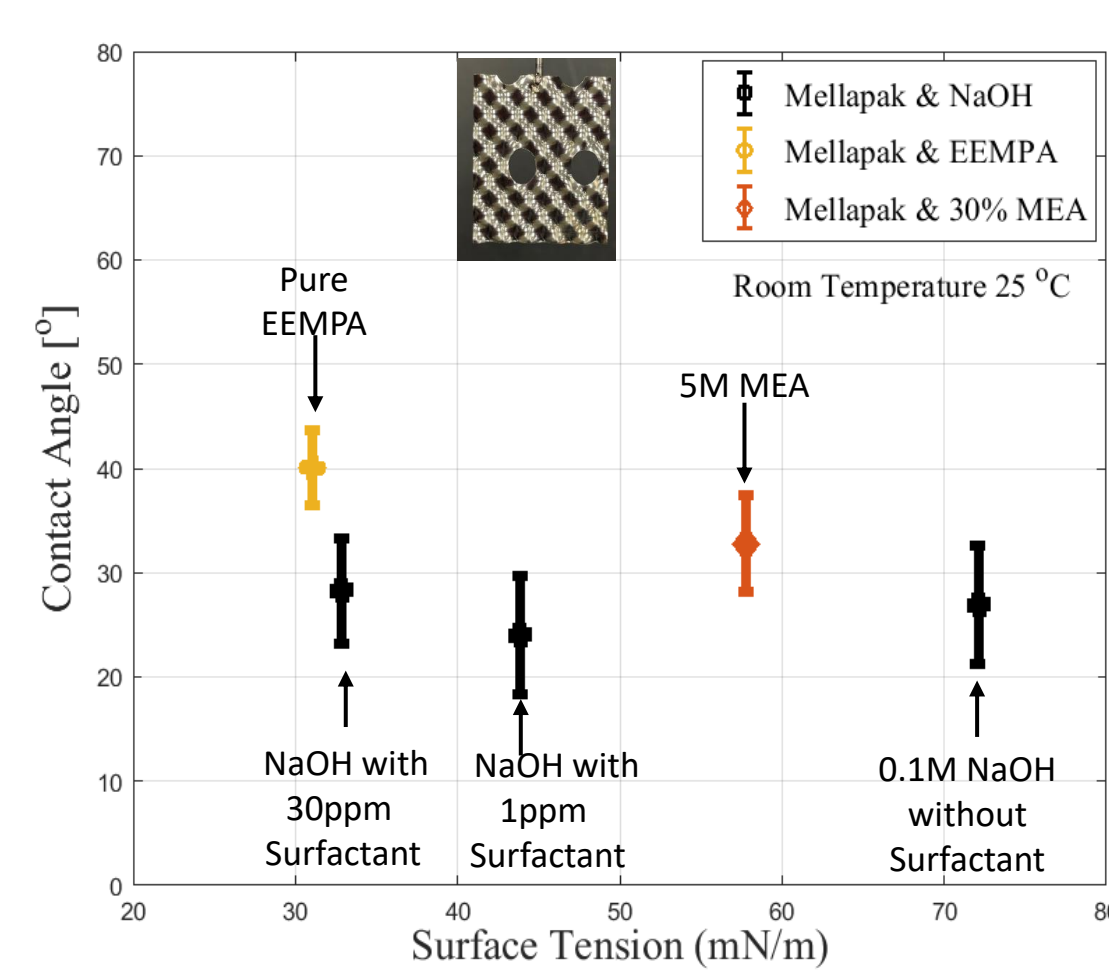
- New capabilities for solvent/packing interaction
 - 3D CT reconstruction for packing surface characterization
 - Modify Wilhelmy plate method for carbon capture
 - Testing with temperature and loading control



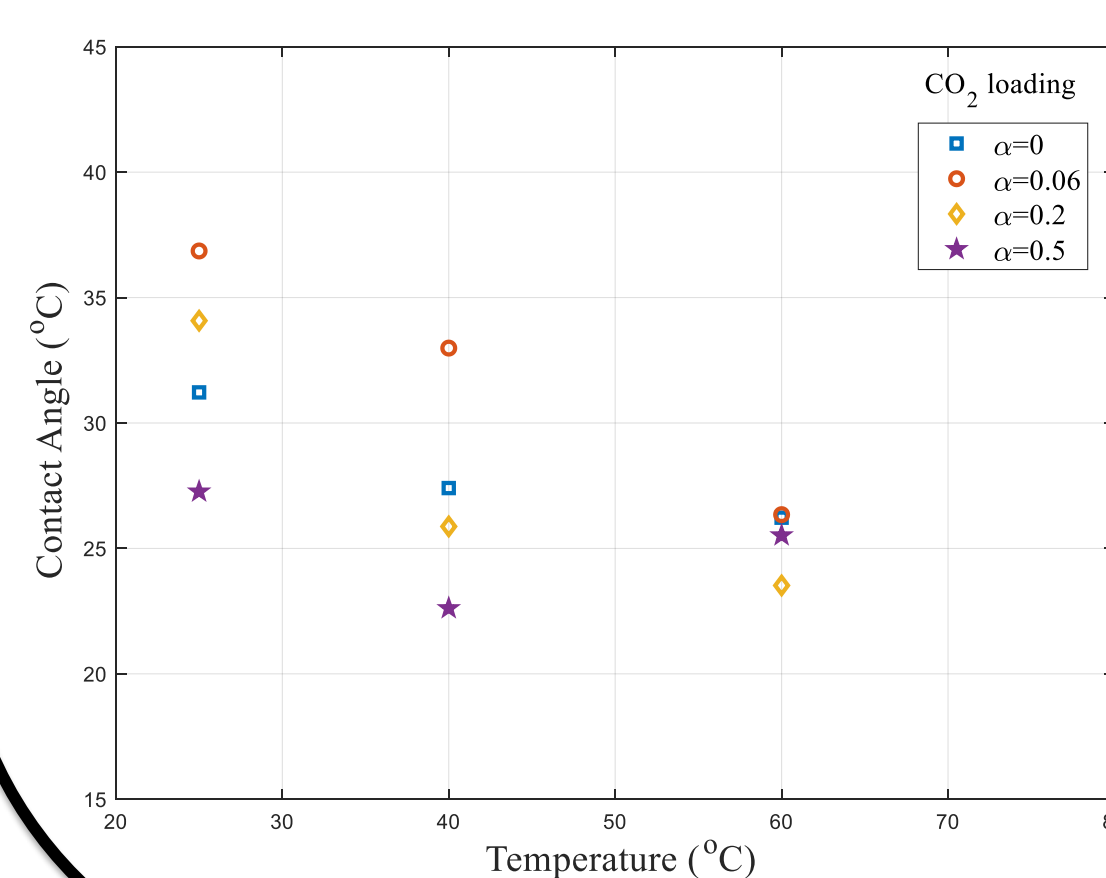
CA: Coupon feature effect



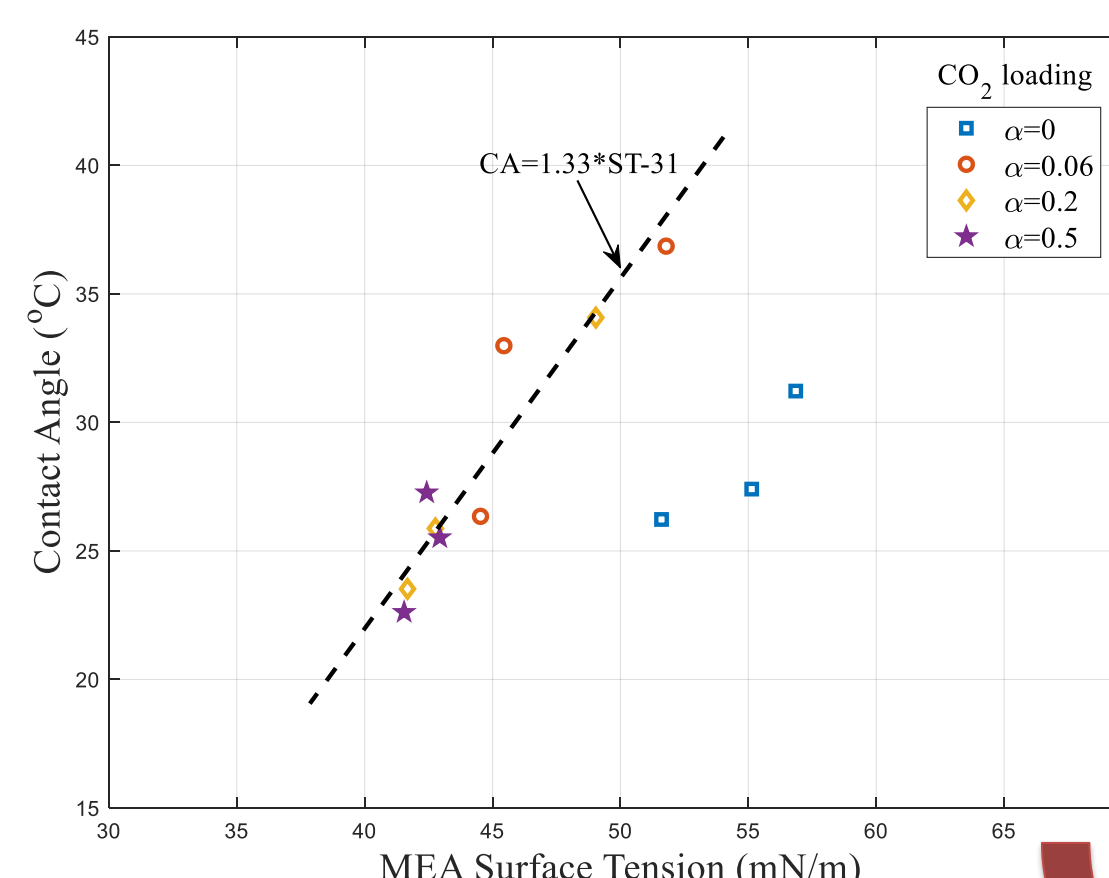
CA: Solvent effect



CA: Temperature effect (MEA)

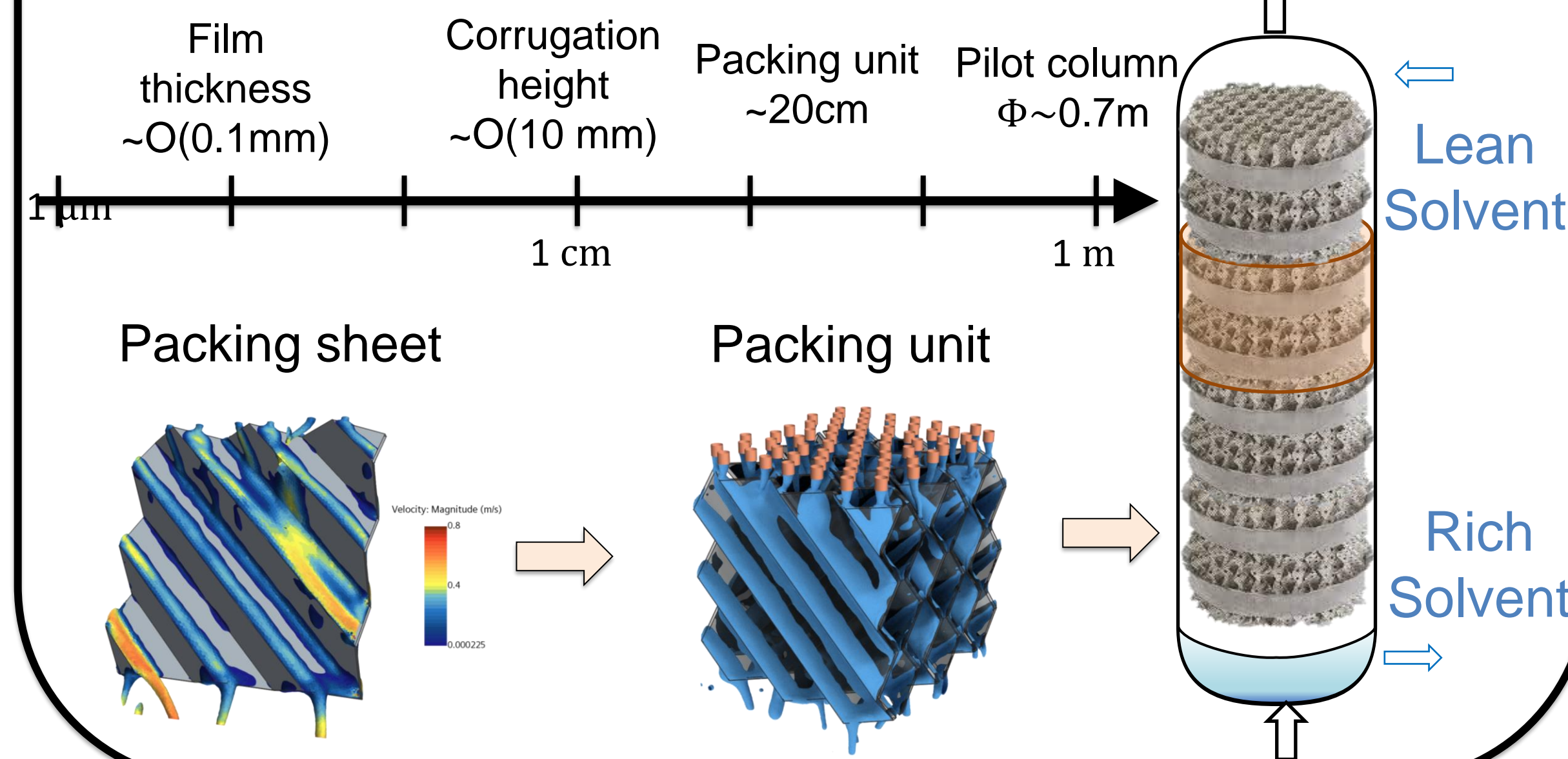


CA: Loading effect (MEA)

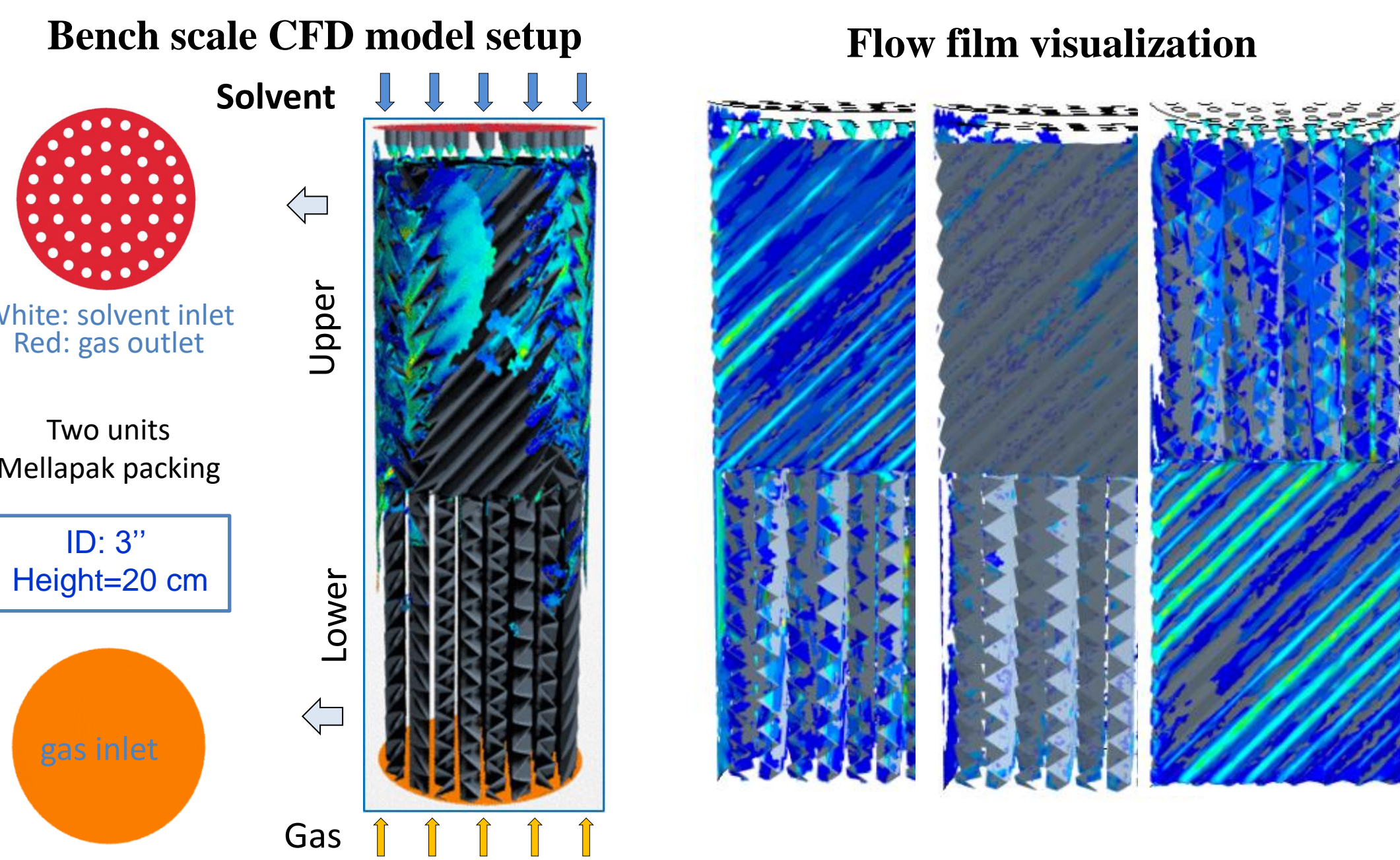


Introduction

Motivations: Supporting pilot tests of EEMPA solvents. (Influential factors: Water content, Loading, Temperature, Degradation)



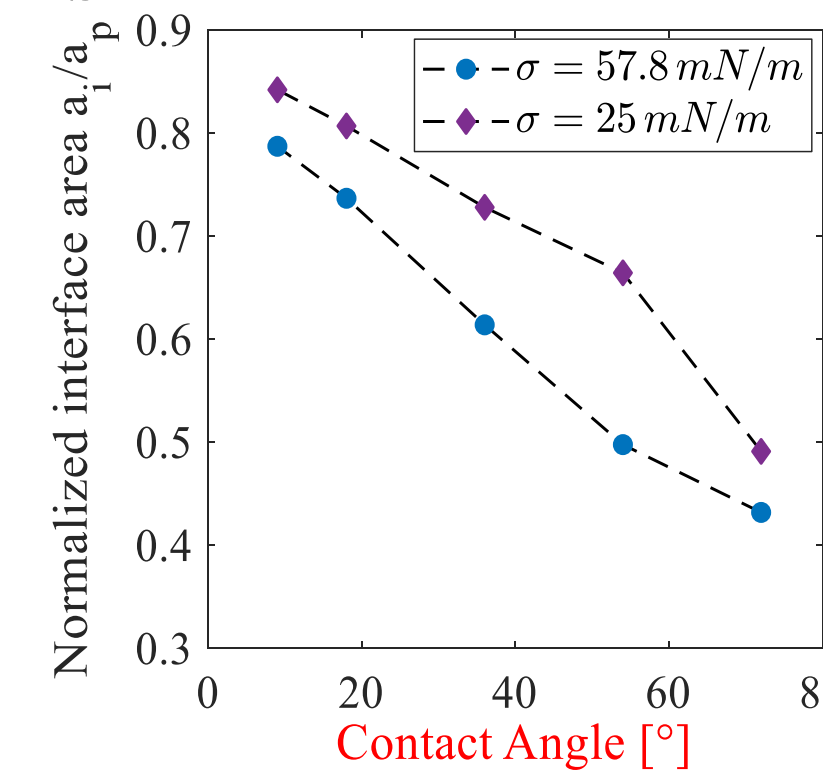
(b) Modeling Interfacial Area (IA) in Packed Column



Packed Column Properties

Model Parameters		Baseline NaOH
Solvent Property	Viscosity μ_L [cp]	From exp.
	Surface Tension σ [mN/m]	From exp.
Solvent Flow Rate u_L [L/min]		From exp.
Gas Flow Rate u_G [SLPM]		From exp.
Contact Angle θ [°]		28°

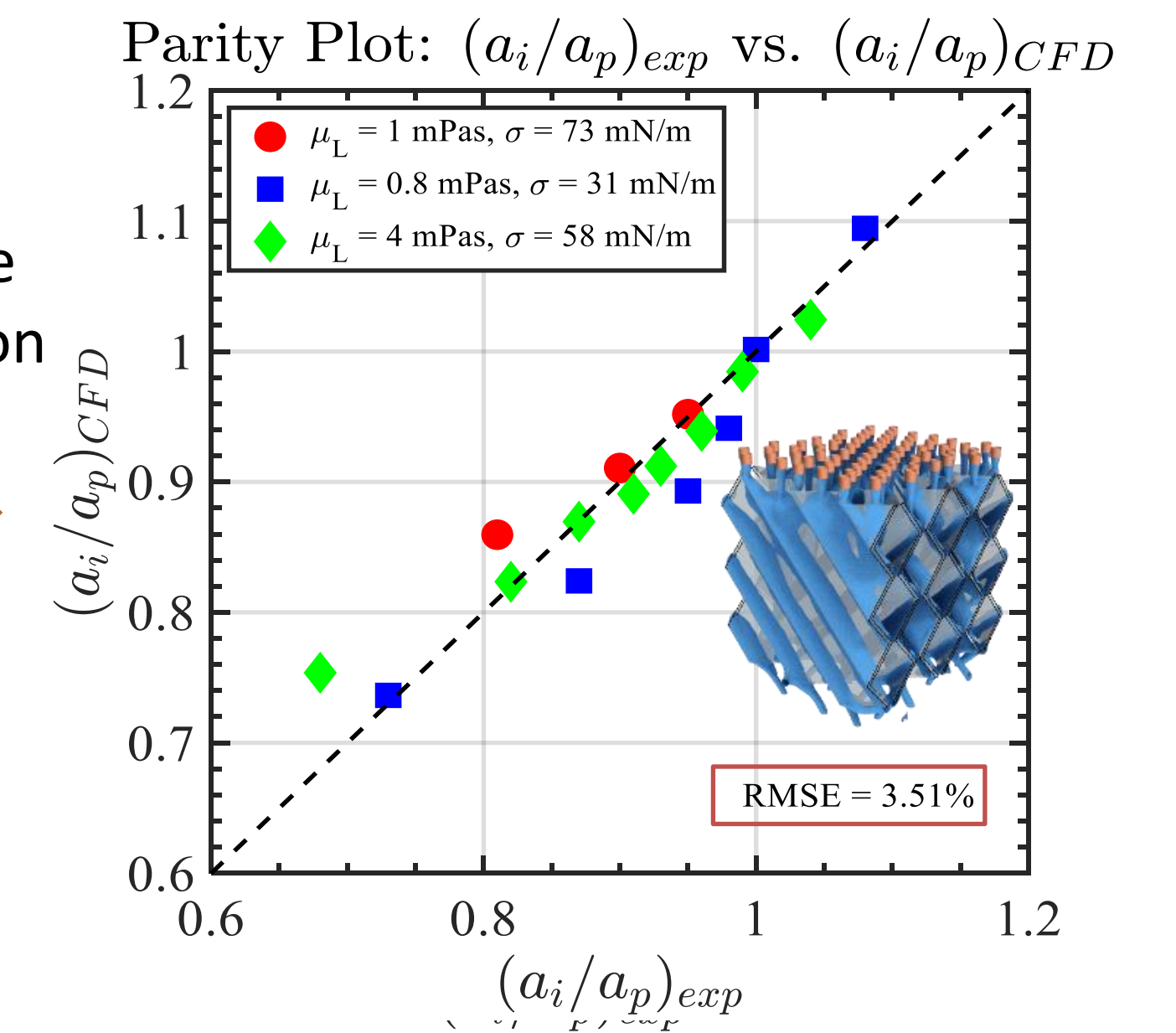
Surface tension effect on IA



(c) Model Validation with SRP Column

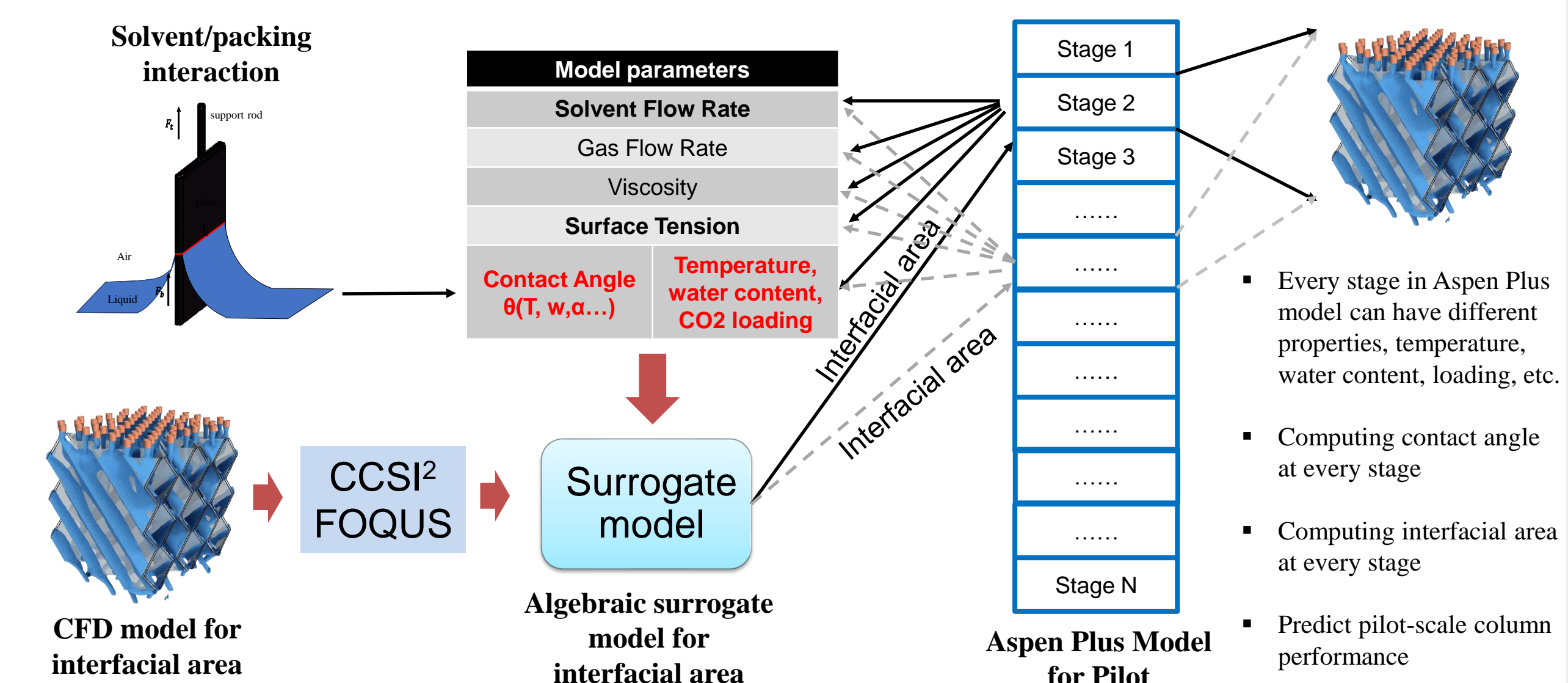


Provide validation data



- Using NaOH to extract interfacial area a_e experimentally
 - Well known fast kinetics of NaOH
 - Extract a_e through CO₂ absorption
 - The gas-absorption/chemical-reaction (GACR) method

(d) Coupling with Aspen Plus for Pilot Support



(e) Conclusion & Future Work

- New capabilities developed for characterizing complex solvent/packing interaction
- Interfacial area (IA) model for different solvents/packing: good agreement with SRP column
- Integration with Aspen Plus for pilot column test via CFD informed surrogate IA models
- Tools release planed: 1. IA Surrogate model; 2. Interface area module for Aspen Plus

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