Phase behavior deviates in nanopores due to nanoconfinement effects:
Prior macroscopic phase diagram fails for nanoporous media.

Research questions:
I. What is the primary factor that controls phase behavior of hydrocarbon mixtures in a nanopore? Capillary pressure vs. adsorption?
II. How does the nanoconfinement effect manifest in a multiscale nanopore structure?
III. Can we derive new macroscopic thermodynamic phase diagrams for nanoporous media?

Methods:
1. Representing the pore structure
2. Thermodynamic equilibrium inside a single pore
3. Mass transport between pores

Results:
1. Phase diagram for a single pore
2. Connected pores: nonequilibrium → equilibrium

Summary:
I. Single pore: adsorption vs capillary pressure; pore size vs pore geometry
II. Effect of multiscale pore structure: oil tends to reside in smaller pores
III. Novel pore-scale modeling framework: derive new macroscopic phase diagrams