

# CLEAN RESOURCES

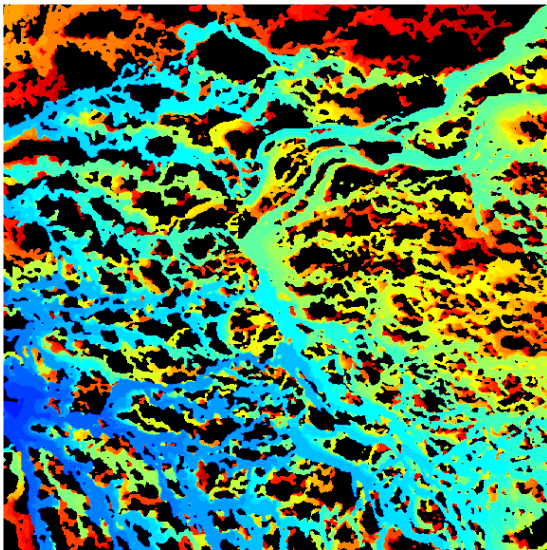
## ADVANCED HYDROCARBONS

CLEANER HYDROCARBON PRODUCTION - RECOVERY TECHNOLOGIES

### FUNDING DETAILS

## Hydrocarbons in Nanochannels: A Window into Alberta Shale/Tight Oil Production

Oil and gas production from fractured reservoirs is governed by complex phase dynamics of hydrocarbon mixtures at high temperature and pressures in nanoscale pores. This is an intensely complex process that is poorly understood. This project leveraged the expertise, tools, and funding from Schlumberger Canada Ltd. in a 4-year partnership with the Sinton Group at the University of Toronto. The project addressed two process-critical questions: (i) "How are the phase transition conditions for pure hydrocarbons altered in nanopores?" and (ii) "How is the phase change of hydrocarbon mixtures influenced by the combination of nanopores and microfractures, under reservoir conditions?"



#### RECIPIENT:

University of  
Toronto – Dr. David  
Sinton



#### PARTNERS:

Schlumberger  
NSERC



#### TOTAL BUDGET:

\$805,000



#### AI FUNDING:

\$208,000



#### PROJECT DATES:

OCT 2015 –  
AUG 2019



#### PROJECT TRL:

Start: 3  
End: 9

## APPLICATION

Production from unconventional shale/tight oil operations has reshaped global energy. The immediate importance of this technology is underscored by the recent increase in North American production, and a marked decrease in oil price – with broad implications in Alberta and Canada. The methods developed in this project are marketable as service offerings within the growing unconventional shale/tight oil industry. Alberta-based Interface Fluidics has commercialized this technology and offers these services worldwide.



# ALBERTA INNOVATES CLEAN RESOURCES

## ADVANCED HYDROCARBONS

### CLEANER HYDROCARBON PRODUCTION – RECOVERY TECHNOLOGIES

#### PROJECT GOALS

- The key goals of the project are to answer these process critical questions: (i) “How are the phase transition conditions for pure hydrocarbons altered in nanopores?” and (ii) “How is the phase change of hydrocarbon mixtures influenced by the combination of nanopores and microfractures, under reservoir conditions?”
  - Developing experimental methods to measure hydrocarbon phase transition at the nanoscale (10 nm – 100 nm)
  - Achieving unprecedented resolution of fluids and liquid-gas interfaces in sub-10 nm nanopores.
  - Enabling the direct visualization of injected fluid interactions with reservoir fluids in a nanoporous media, and a means of screening injected fluids and injection conditions.

#### BENEFITS TO ALBERTA

- The successful implementation of this technology or use of the knowledge generated could result in:
  - Reductions in water use and emissions associated with hydraulic fracturing operations are expected with the improved resolution offered by these fluid testing systems. This approach increases the energy return on investment in these operations.
  - Improvements of the ability for operators to select chemicals and additives and conditions that perform best in nanoporous reservoirs.
  - Commercial uses of nanofluidic oil and gas services through the Alberta-based startup Interface Fluidics Ltd. With laboratories in Edmonton and a business office in Calgary, Interface Fluidics provides testing services to energy and chemical companies worldwide. The company has 35 full time staff and attracted \$6M in international venture capital in 2019.



9 Publications



2 Students  
Trained



1 - 10 Project Jobs



1 - 10 Future Jobs



1 New  
Products/Services



1 Spinoff  
Companies

#### CURRENT STATUS

#### SEP 2019

The project is complete. The spin-off company, Interface Fluidics, is offering commercial services in nanopore evaluations to assist oil and gas operators optimize operations. The final report for this project will be released to the public in September 2020.