

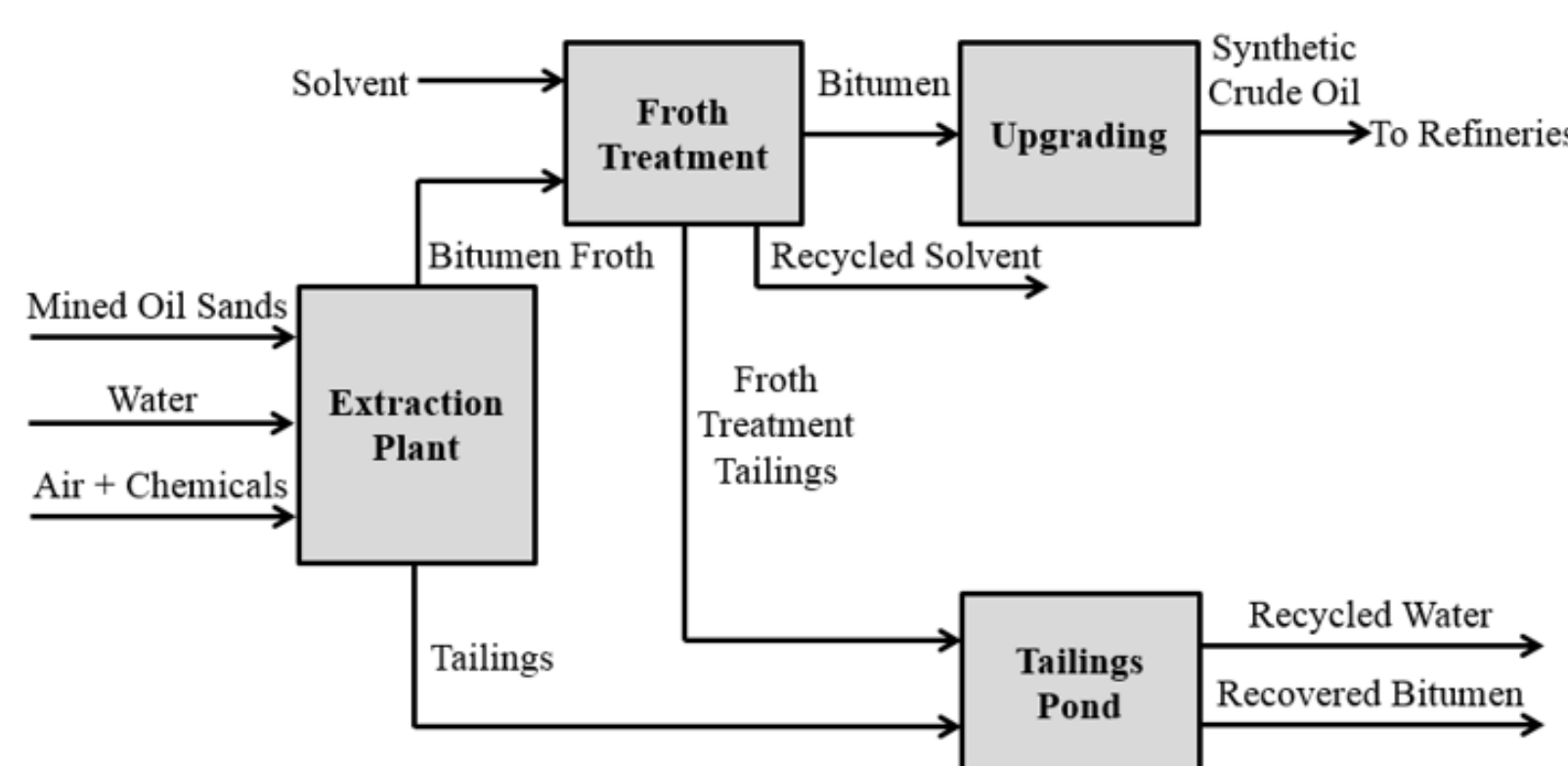
In-Situ Hot Filtration of Hydrothermally Upgraded Bitumen Product

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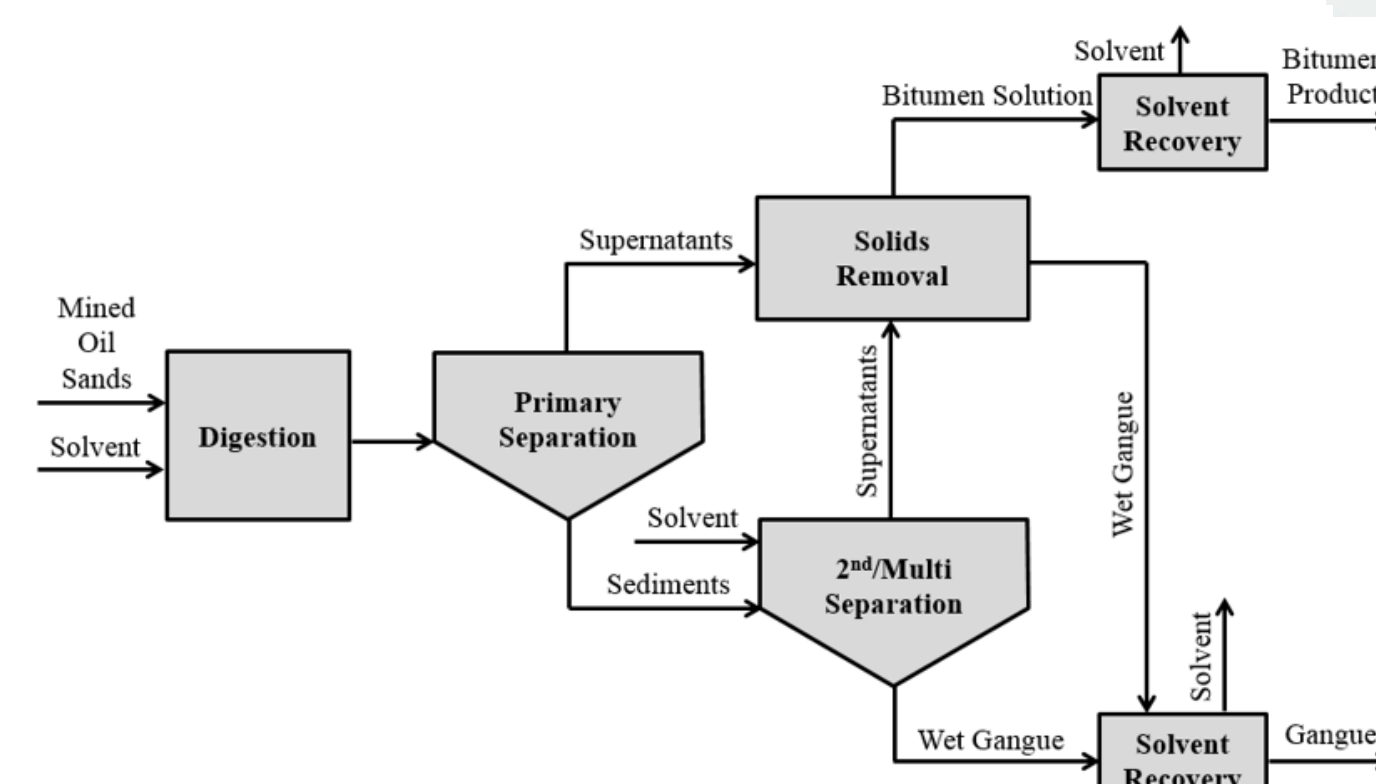
BACKGROUND

Contamination of bitumen oil by mineral solids is an intractable problem in bitumen extraction from oil sands ore, both water-based extraction and non-aqueous extraction.

Water-Based Extraction

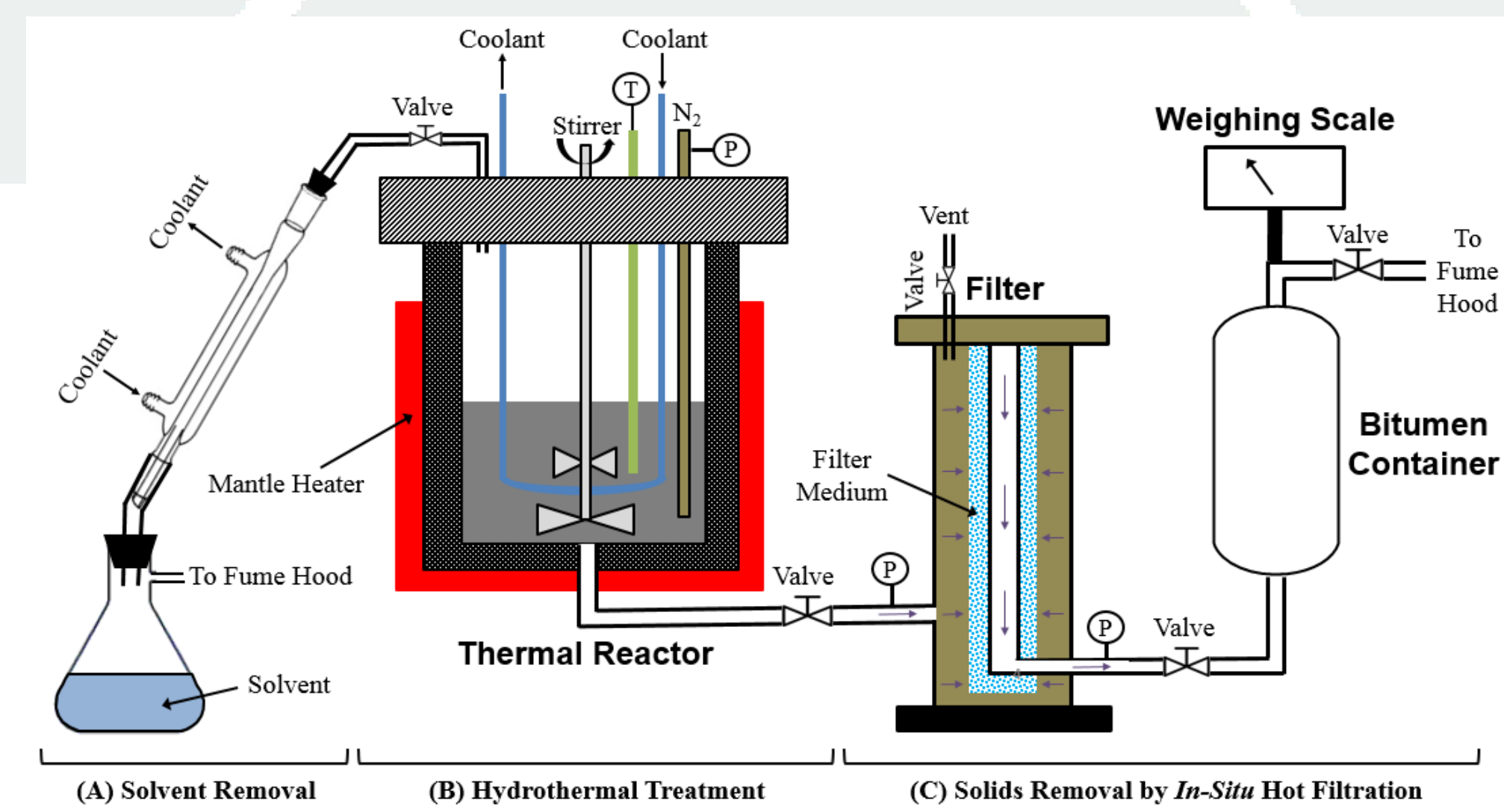


Non-Aqueous Extraction



AIMS AND OBJECTIVES

- ❖ Hydrothermal treatment of bitumen product followed by *in-situ* hot filtration
- ❖ Combination of bitumen cleaning and partial upgrading
- ❖ Obtaining dry, solids-free (<300 ppmw), and pipelinable bitumen in an integrated and holistic manner.



RESULTS

❖ Hydrothermal treatment followed by venting and filtration

➔ Water: 14 to 0.03 wt%; Solids: 8 to 0.08 wt%

➔ Specific resistance to filtration: 8×10^{11} m/kg

❖ Stacking behavior of platy clay particles

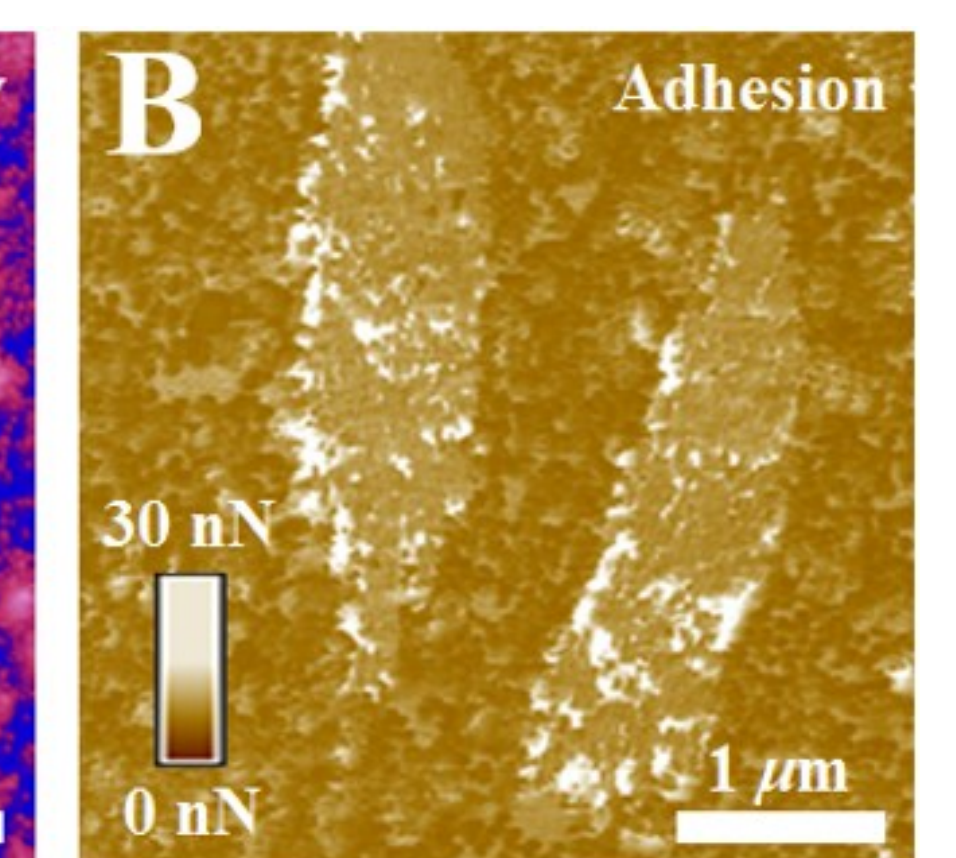
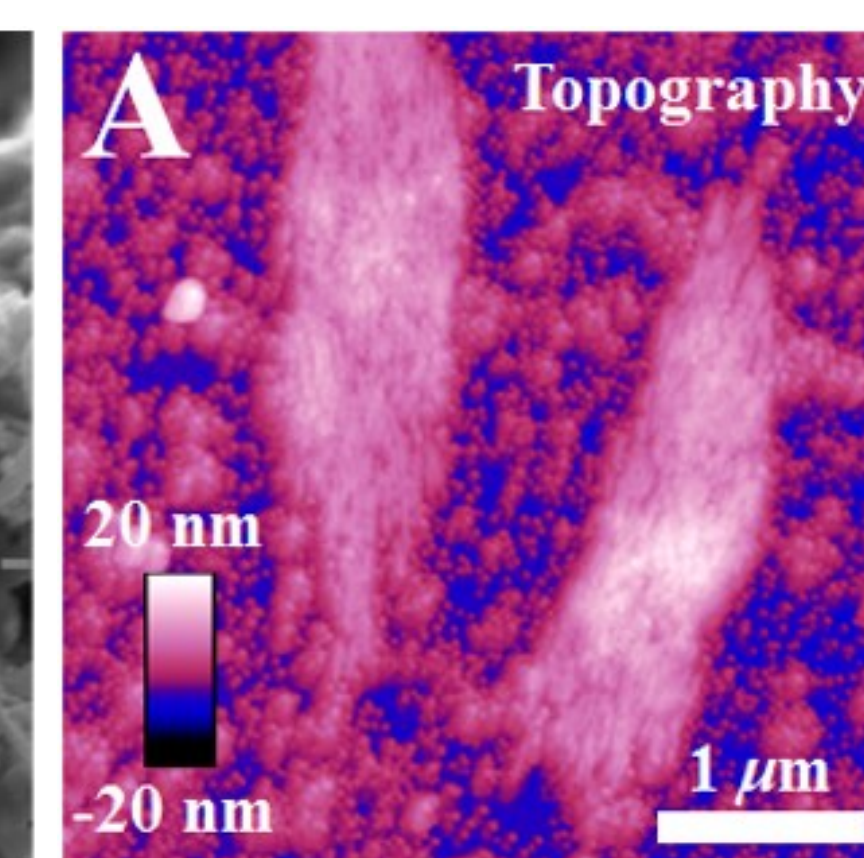
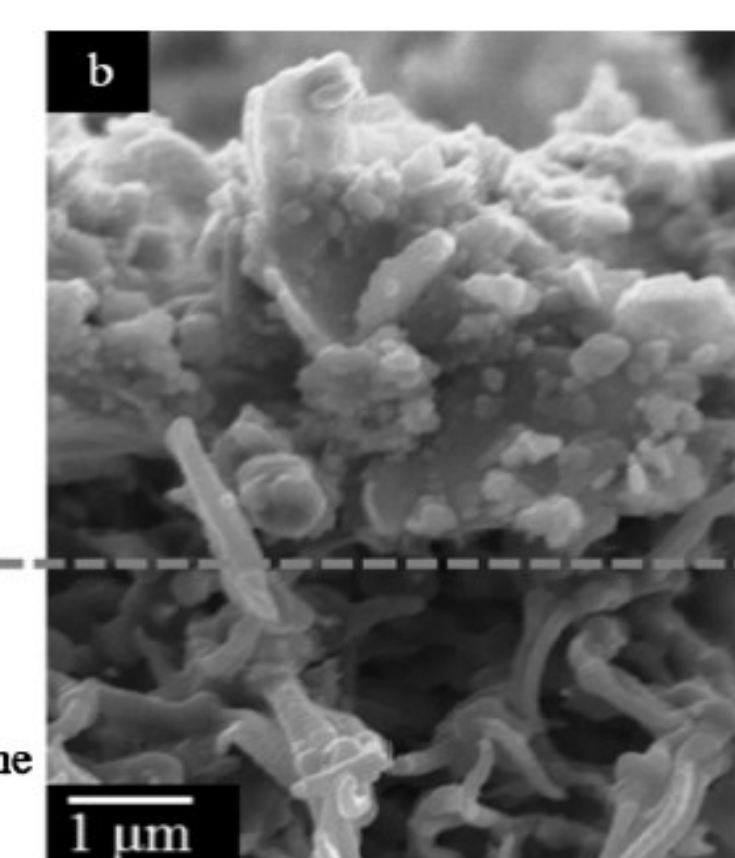
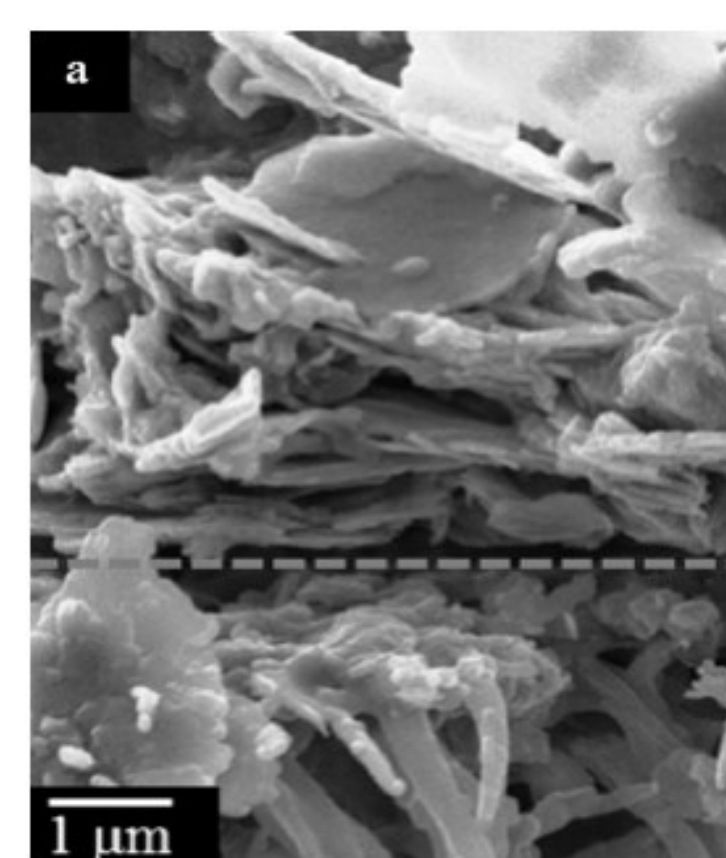
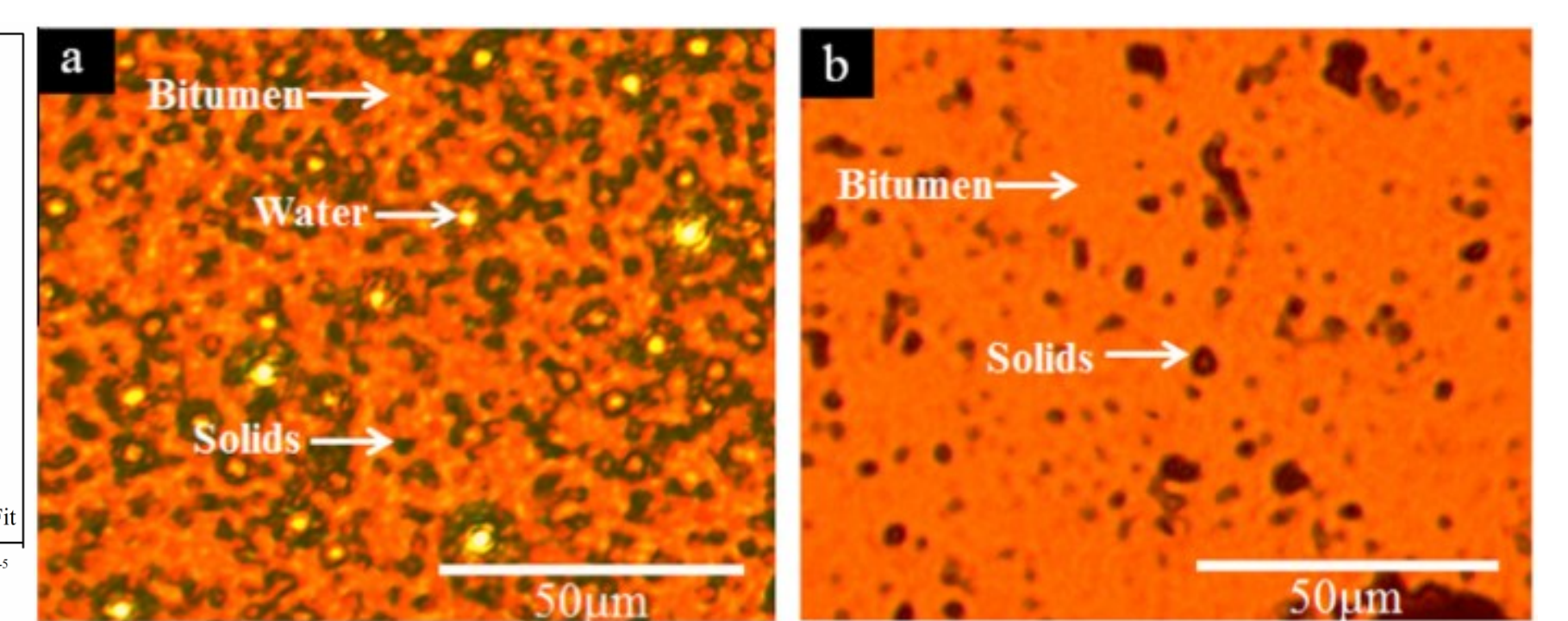
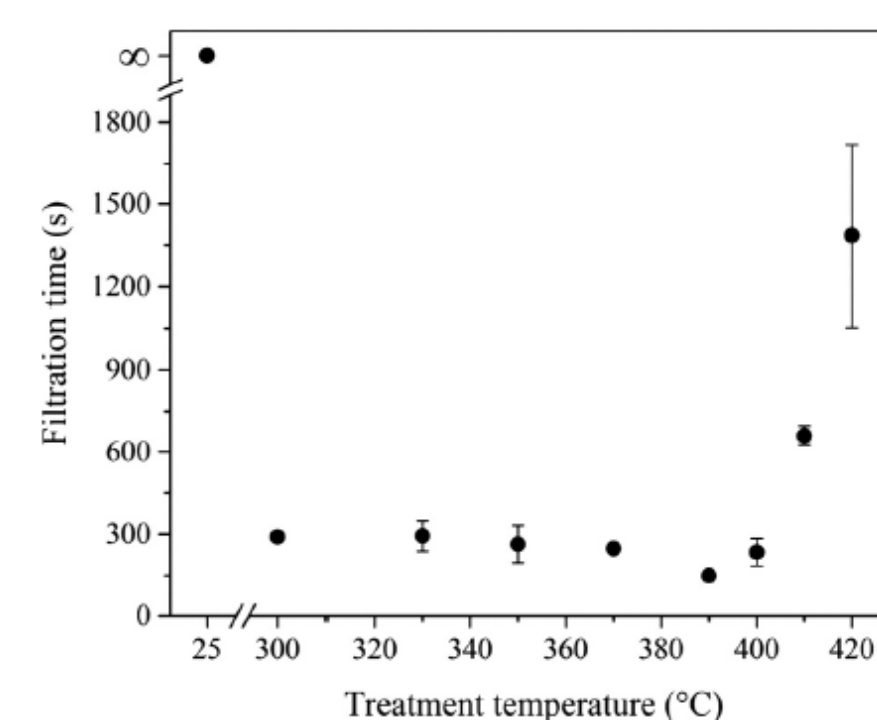
➔ Orientation: preferential to random

❖ Organic coating on clay surfaces

➔ Patchy distribution: $17 \pm 6\%$, 1.4 nm

➔ Surface carbon concentration: 35.6 to 47.7 at. %

❖ Estimated hot filtration rate: $0.33 \text{ m}^3/(\text{m}^2 \text{ h})$



FUTURE DIRECTIONS

❖ A larger scale study will be conducted

using a 5.5-L thermal reactor and industrial oil filter

❖ Non-aqueous extracted bitumen will

be used as oil sample

❖ The operating conditions will be

optimized and the bitumen filterability will be quantitatively determined



PARTNERS

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FES PROJECT OVERVIEW

Project # T08-P02

One of the challenges for a feasible NAE process is that the final extracted bitumen product is free of water and mineral/clay solids so that it can be used as refinery feed.

This project is a systematic investigation of various physical and chemical methods aimed at cleaning up the NAE bitumen from oil sands to meet this target while maintaining high bitumen recovery.