



### Multifunctional Cationic Bipolymers for Enhanced Bitumen and Crude Oil Processing

ID# 2026-062

#### HIGHLIGHTS

- **Next-Generation Multi-Phase Demulsification:** Novel cationic random bipolymers engineered as high-performance emulsion breakers (EB) for water-in-oil (W/O), oil-in-water (O/W), and complex emulsions, specifically optimized for bitumen, diluted bitumen, and crude oil processing.

#### OPPORTUNITY

University of Alberta researchers have created a new class of amphiphilic cationic bipolymers that streamline emulsion breaking and fine-solids removal across oil sands and heavy-oil operations. Designed for easy integration into SAGD and bitumen froth treatment, this multifunctional polymer platform can potentially replace current costly, multi-chemical treatment packages with a single, tunable solution.

By simultaneously acting as a demulsifier and demineralizer, the technology improves product quality to pipeline-ready specifications, enhances produced-water treatment to meet tight discharge limits, and reduces fouling, corrosion, and energy losses across downstream systems. The result is a simpler, more efficient, and more sustainable chemical treatment that delivers meaningful efficiency gains and cost reductions as operators face rising environmental and operational pressures.

#### COMPETITIVE ADVANTAGE

- **Molecular Engineering for Complex Feeds:** Leverages proprietary molecular-level understanding of the interactions between cationic bipolymers and surface-active species (e.g., asphaltenes/naphthenic acids), enabling targeted destabilization of persistent emulsions and the removal of fine solids from even the most challenging naphthenic bitumen froths.
- **Versatility Across Emulsion Types:** Unlike traditional demulsifiers that are phase-specific, these bipolymers are effective across W/O, O/W, and complex systems, offering a universal application profile under diverse process conditions.
- **Integrated Multi-functional Treatment:** A single-dose solution capable of simultaneously destabilizing W/O and O/W emulsions in SAGD processing while efficiently removing emulsified water and inorganic solids from bitumen froth. By functioning as emulsion breaker (EB), reverse emulsion breaker (REB) and a wettability modifier, these polymers consolidate multi-step chemical treatment into a single, high-efficiency application.

#### STATUS

- Patent Pending.

#### INVENTORS

- [Dr. Hongbo Zeng](#) and team.

#### MORE INFORMATION

- **Robert Carruthers**  
Associate Director, Technology Transfer Services,  
University of Alberta  
[rwccarruthers@ualberta.ca](mailto:rwccarruthers@ualberta.ca),  
(780)-492-9498