

Functional Nanoparticle-Augmented Surfactant Fluid for Enhance Oil Recovery in Williston Basin

Submitted by:

Department of Petroleum Engineering,
Department of Chemistry, Institute of Energy
Studies – University of North Dakota

- Request for - \$769,134; Total Project Costs - \$1,724,006**
Project Duration: 3 years

PROJECT DESCRIPTION

- The objective of this project is to develop a novel nanoparticle enriched surfactant fluid for enhanced oil recovery (EOR) in the Williston Basin. In this fluid, the nanoparticles will carry surfactant to deeply penetrate rock matrix, then effectively displace oil locked in micro- and nano-pores of tight rocks, and finally carry the oil out of the rocks. The features of the designed nanoparticles will be: 1) controllable delivery of surfactant and alter the wettability of interfaces of oil with the fluid; 2) high mobility, water solubility, stability, and uniform dispersion in the reservoir fluids; 3) tunable chemical composition, shape, size, porosity and functionality; 4) environmentally friendly; and 5) low cost. The commercialization of this technology will lead to higher oil recovery, prolonged reservoir life, reduced operation cost and further minimizing the environmental complications.
- The results will provide conceptual validation of nanoparticle loaded surfactant fluid for EOR in Bakken tight formation. Vital data will be collected based on the fluid performance regarding their wettability, mobility and the effects of EOR in the Bakken play from macro- to nanoscale levels. Positive recovery rates are expected. Accumulated data, mechanisms and optimization outcomes will lay a solid foundation to the technology's commercialization in the near future.

TECHNICAL REVIEWERS' RATING SUMMARY

Technical Reviewer

Statement	Weighting Factor	Technical Reviewer			<u>Average Weighted Score</u>
		<u>G-41-01A</u>	<u>G-41-01B</u>	<u>G-41-01C</u>	
Objectives	9	4	5	4	36
Achievability	7	4	4	4	28
Methodology	8	4	5	4	32
Contribution	8	4	3	4	24
Awareness / Background	5	5	4	4	20
Project Management	3	4	4	4	12
Equipment / Facilities	2	3	4	4	6
Value / Industry- Budget	4	3	4	4	12
Financial Match – Budget	4	2	3	4	12
Average Weighted Score		191	205	200	198
Maximum Weighted Score					250 possible points

TECHNICAL REVIEWER TOTALS

- ◎ G-41-01A

Average Weighted Score: **191 out of 250**

FUNDING TO BE CONSIDERED

- ◎ G-41-01B

Average Weighted Score: **205 out of 250**

FUND

- ◎ G-41-01C

Average Weighted Score: **200 out of 250**

FUND

DIRECTOR'S RECOMMENDATIONS

To fund only the direct expenses in the amount of \$562,212 over a three year period.