



## Karym G. Kinnibrugh, Ph.D.

Senior Consultant

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## Background

Dr. Karym Kinnibrugh is a Materials Scientist who graduated with a Ph.D. from Texas A&M University in Materials Science and Engineering and holds a B.Sc. in Chemistry from Pontificia Universidad Católica del Perú. Her expertise focuses in the electrochemical and corrosion field which includes electrochemical testing techniques, corrosion diagnosis, failure analysis, and corrosion control and prevention. She is proficient in characterization and analytical techniques such as metallography, AFM, SEM, TEM, XPS, Confocal Laser Scanning Microscopy, DSC, FT-IR, HPLC, GC, NMR, TMA, TGA, XRD, UV-Vis, AAS, ICP-AES, Zeta Potential, contact angle, and surface and interfacial tension.

Dr. Kinnibrugh is also a product development professional with 15 years of diverse research and development experience in surfactants, emulsions, colloids, polymer functionalization, biomaterials, surface chemistry, interfacial phenomena, and organic synthesis.

## Professional Engagements

### • Oil and Gas Industry

- Houston, Texas (2010-2024), Responsible for the development of guar-based systems for fracturing applications, asphaltene control, and dispersion additives for midstream applications and enhanced oil recovery additives and surfactant polymer flood package for tight oil fields in China (upstream). Formulation of low-cost surfactant package for desalting and dehydrating purposes of heavy crude oil (Venezuela). Design new paraffin inhibitors and formation consolidation additives. Development of a microemulsion non-emulsifier additive for fracturing and acidizing applications as well as formulation of antisludge and iron control additives.

### • Biomaterials for Drug Delivery Applications

- Texas A&M University – College Station, Texas (2005-2010), Responsible for synthesizing and characterizing functionalized PEO-based diblock copolymer vesicles for controlled drug delivery applications. Oxidized hydroxyl end group of PBd120PEO89 diblock to its corresponding carboxylic acid using a new and clean two-phase reaction system. Diblocks were chemically labeled, and vesicles were surface-modified through a novel EDC/NHS covalent coupling reaction performed in organic solvents. Designed and characterized stimuli-responsive vesicles to the presence of a reductive environment. Measured in vitro drug

release/cell uptake transported by polymeric vesicles. Expertise in spectroscopic, and microscopy techniques, including FTIR, NMR, UV-Vis, Fluorescence Microscopy, Confocal Microscopy, and Dynamic Light Scattering (DLS).

- **Materials Characterization of Galvanized Structures**

- Technische Universität Ilmenau, Institute for Materials Engineering - Ilmenau, Germany (2002), Responsible for electrochemical corrosion and cathodic protection of submerged galvanized structures in fresh waters. Proficiency in electrochemical techniques such as Tafel curves, resistance polarization, and potentiostatic and potentiodynamic anodic polarization measurements.

## Professional Experience

- **Rimkus** **2025 – Present**
  - Senior Consultant  
Provides Materials Science and Engineering consulting services to law firms, insurance companies, and corporations for the purpose of determining the root cause of product and equipment failures. Determine materials and mechanical systems failures, based on corrosion, fatigue, wear, or environmental-based degradation of metallic, ceramic, composite, or polymeric components, systems, and structures.
- **Sunita Hydrocolloids, Inc.** **2023 – 2024**
  - Chief Chemist Research and Development  
Product development from the laboratory bench to commercialization. Patent landscaping, product testing and evaluation, supervision, and approval of final products. Customer face-to-face interaction, marketing, and technical sales support. Guar-based systems development for food and oil and gas industries.
- **SI Group** **2022 – 2023**
  - Lead Chemist  
Development and evaluation of asphaltene control and dispersion additives. Asphaltene testing and characterization through direct and indirect quantification method as well as Turbiscan measurements. Emulsion breaker development and evaluation for midstream applications. Use of Basic Sediment and Water testing as well as bottle testing for performance evaluation.
- **CNPC USA** **2017 – 2020**
  - Senior Research and Development Scientist  
Research focused on chemical flooding enhanced oil recovery for tight oil recovery. Reservoir characterization and evaluation, chemical formulation for surfactant polymer flood, polymer selection and property measurements, polymer transport studies, development of low interfacial tension and foaming surfactants, and performed surfactant polymer core flood studies (China).  
  
Development and validation of an all-in-one fracturing, injecting, and oil displacement multi-purpose fracturing fluid system for tight oil applications, accompanied by a new and highly efficient compatible oil displacement agent with enhanced oil-water miscibility to increase oil displacement rate (China).
- **Hexion** **2014 – 2016**
  - Research and Development Scientist  
Designed experiments for paraffin inhibitors and formation consolidation additives testing. Development and validation of new paraffin inhibitor formulation that decreased or inhibited paraffin deposition with a

performance advantage over current market products for shale gas production in the North American region. Development of a new water-based formation consolidation resin system that can be cured to immobilize formation fines without significant reduction in conductivity of the matrix. Successful cost reduction efforts included designing experiments and supervising the project with a result of 20% raw materials reduction/savings.

- **Nalco Champion, An Ecolab Company** **2010 – 2014**
  - Principal Chemist
 

Development, evaluation, and simulation of chemical programs for the oil and gas industry. Development and validation of new chemistries and novel products for acidizing, fracturing, and enhancing oil recovery applications in the energy services business. This includes, but is not limited to, non-emulsifiers, anti-sludge, and iron control additives. Competency in chemical structures, handling, characterization, and analytical techniques. Use of scientific methods to design and execute specific tests and recommendations for customers.

Assisted in the commercialization of new products by providing technical support to marketing and sales engineers as well as onsite technology validation and trial support to increase efficiency and ensure correct usage of novel products. Supported business retention efforts and sales opportunities.
  
- **Corrosion and Protection Research Institute** **2001 – 2004**
  - Research Chemist
 

Risk analysis, diagnosis, control, and prevention of corrosion processes. Cathodic protection assessment of buried and immersed structures. Characterized and monitored the corrosivity of different environments through volumetric, gravimetric, electrochemical, and instrumental methods according to international standards (ASTM, EPA, and DIN). Proficiency in analytical techniques, including Inductively Coupled Plasma Atomic Emission Spectroscopy (ICP- AES), High Performance Liquid Chromatography (HPLC), Gas Chromatography (GC), and Atomic Absorption Spectroscopy (AAS).

## Education and Certifications

- **Materials Science and Engineering, Ph.D.:** Texas A&M University (2010)
- **Chemistry, B.Sc.:** Pontificia Universidad Católica del Perú (2000)
- **Organizations:** Member of the Society of Petroleum Engineers (SPE) and the American Chemical Society (ACS)

## Presentations and Publications

- **“Novel Micro-emulsion Based Non-emulsifier for Fracturing Applications”** by Kinnibrugh, K., Nguyen, D., 14th International Conference on Petroleum Phase Behavior and Fouling (Rueil-Malmaison, France), June 12<sup>th</sup>, 2013.
- Kinnibrugh, K., Silas, J. and Cheng, Z. **“Interaction of functionalized PEO Block Copolymer Vesicles in Contact with Mammalian Cells”**, in preparation.
- Kinnibrugh, K., Silas, J. and Cheng, Z. **“Controlled Release of Functionalized Block Copolymer Vesicles Contents in a Reducible Environment”**, in preparation.
- Kinnibrugh, K., Chang, Y., Casey, L., Silas, J. and Cheng, Z. **“Functionalization of PEO Block Copolymer Vesicles”**, submitted.

- **“Interaction of PEO-based Block Copolymer Vesicles with RASMC Cultures”** by Kinnibrugh, K., Silas, J., Cheng, Z., 61st ACS Southeastern Regional Meeting (San Juan, PR), October 24th, 2009.
- **“Functionalization of PEO-based Block Copolymer Vesicles”** by Kinnibrugh, K., Silas, J., Gaspard, J., 237th ACS National Meeting and Exposition (Salt Lake City, Utah), March 22nd, 2009.
- **“Functionalization of PEO-based Block Copolymer Vesicles”** by Kinnibrugh, K., Silas, J., 82nd ACS Colloids and Surface Science Symposium (Raleigh, NC), June 17th, 2008.
- **“Polymer Vesicle Based Cellular Mimics”** by Silas J., Gaspard J., Kinnibrugh K., 2007 AIChE Annual Meeting (Salt Lake City, Utah), November 6<sup>th</sup>, 2007.
- **“Electrochemical Corrosion and Cathodic Protection of Submerged Galvanized Structures in Fresh Waters”** by Kinnibrugh, K., Diaz, I., 1st ACS Pan American Conference, (San Juan, PR), June 20th, 2000.