

TCSUH SPECIAL SEMINAR

Wei Wang, Ph.D.

Aramco Research Center, Boston
Cambridge, MA, USA

Tuesday, February 18, 2020

Room 102, Houston Science Center, 2:00 p.m. – 3:00 p.m.

Reservoir-on-a-Chip Platform for Tracking Interfaces of Nanofluid-Oil-Rock in Carbonate Reservoir Micromodels

ABSTRACT: Applications of nanotechnology in the oil and gas industry have been on the rise over the past decade. As a major step forward in realizing a useful “Reservoir-on-a-Chip,” a method has been developed to fabricate synthetic carbonate reservoir micromodels by in-situ growing a layer of calcite nanocrystals in the glass microfluidic channels. The dimensions and geometries of the micromodels are controllable; and the wettability of the calcite-coated microchannels can be tuned to simulated oil reservoir conditions, making the oil-wet surface more faithfully resemble a natural carbonate reservoir rock. With the advantage of its excellent optical transparency, the micromodel allows us to directly visualize and quantify the complex multiphase flows and geochemical fluid–calcite interactions by advanced spectroscopic and microscopic imaging techniques. This calcite-coated micromodel system allows us, for example, to perform a water–oil displacement experiment in very small-volume samples for dramatically-accelerated screening of candidate chemical additive formulations for enhanced oil recovery (EOR) operations.

BIO: Dr. Wei Wang is a Research Science Specialist at Aramco Research Center-Boston, Aramco Services Company (ASC). Before joining the ASC as a Founding Member of Aramco Global Research Centers-North America in 2012, he had been a Staff Research Scientist at Oak Ridge National Laboratory (ORNL) since 2001. Prior to that, he worked as a Research Associate at the University of Pittsburgh and as an Associate Professor at the Ocean University of China.

Wei obtained his Ph.D. degree in Physical Chemistry from the Changchun Institute of Applied Chemistry, Chinese Academy of Sciences (CAS) in 1993. Over the past 25 years, his research has centered on molecular spectroscopy, fabrication of nanomaterials and nanomaterial-based sensors and devices. During his tenure at ORNL, he was the PI or co-PI for 17 research projects funded by DOE, BATTELLE and ORNL. In the Aramco Research Center, his current research is focused on the application of nanomaterials and nanotechnology for reservoir description and enhanced oil recovery in the oil and gas industry. Wei has authored or co-authored more than 130 research papers, 4 book chapters and 15 US patents.

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