



JAMES MADISON
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Chemistry and Biochemistry Department Seminar
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The Chemical and Morphological Character of Petroleum-Generating Organic Matter at Nanoscales

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Understanding the chemical composition and morphology of petroleum-generating (oil and gas) organic matter is essential when assessing the generation, accumulation, migration, and recoverability of hydrocarbon resources. The continuing shale revolution within the United States and growing interest in shale resources globally necessitates knowledge of petroliferous organic matter at the nanoscale as hydrocarbons in shale formations are largely stored within organic matter-hosted nanopores. Furthermore, the chemical and morphological character of shale organic matter influences carbon dioxide (CO₂) injection and storage potential within shale formations following resource extraction. In this presentation, I will first highlight on-going efforts at the U.S. Geological Survey to characterize the chemical composition of shale organic matter at nanoscales to understand molecular fractionation following petroleum-generation and expulsion using atomic force microscopy-based infrared spectroscopy. The second part of my talk will focus on the application of neutron scattering to understand CO₂ adsorption within shale organic matter nanopores less than 10-nm in radius, which informs carbon sequestration efforts.