

## **Organic Diagenesis in the Cretaceous Mowry Formation, with Associated Pore Formation and Wettability Alteration**

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### **ABSTRACT**

The Mowry Formation is a significant hydrocarbon source rock in Rocky Mountain Basins, with petroleum production in excess of 1.2 BBO and 2.2 TCFG in the Powder River Basin alone. It has become a target of exploration efforts for unconventional resources in several basins. SEM images of fresh and ion-milled surfaces from 6 Mowry cores across a range of thermal maturities show the prevalence of organic-hosted and organic-lined pores with various morphologies and mineral associations. Both kerogen and secondary migrated organic matter ("bitumen") occur in these samples, but most organic-associated porosity occurs in conjunction with bitumen, which frequently lines interparticle pores. Additional pores have developed in the bitumen as a result of further maturation after initial migration. MicroCT imaging of contrast-enhanced organic matter shows a continuous, primarily oil-wet (organic-associated) pore network. Clay-hosted porosity is also common, and appears to be water-wet where not lined with bitumen. SEM images of fresh surfaces also show a limited range of organic matter morphology as well as evidence of molecular sieving, where hydrocarbon aggregations appear to have piled up at pore system bottlenecks, presumably pore throats too small to allow large OM molecular clusters to pass.