The motivation for this work is the advent of tight reservoirs as important sources of hydrocarbons, and an incomplete understanding of relevant physical mechanisms responsible for flow in nanoscale pore spaces. Fluidic models could be useful in replicating and improving understanding of fluid flow in tight rocks. To that end, a Bakken shale sample is characterized with the aim of creating a 2D representation, and etching and bonding techniques for nanofluidic devices are explored. Characterization will include nanoscale imaging, helium pycnometry, nitrogen sorption, mercury injection, and total organic carbon measurements. A 3D reconstruction of the sample collected using Focused-Ion-Beam (FIB) Scanning Electron Microscopy with a voxel size of 2.44 nm² by 5 nm (performed by Dr. S. Saraji in Prof. Piri’s lab) serves as the starting point for the 2D representation. This particular sample has visibly interconnected porosity in 3D with much of the porosity interconnected by throats ranging from approximately 30 to 200 nm in diameter, as determined by nitrogen sorption. A base image will be constructed by projecting the 3D pore structure onto a single plane. Pore and throat sizes will match those measured in FIB reconstructions and nitrogen sorption tests. Using an FIB and varying the energy settings, nanoscale channels are etched on a borosilicate substrate to establish channels size limitations with this technique. Also, the process of etching nanoscale features using electron-beam lithography will be discussed along with challenges related to bonding.

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