

Fabric of Shales Relating to Sedimentary Processes and Gas Shale Characteristics

Neal R. O'Brien¹ and Roger Slatt²

¹Geology Department, SUNY Potsdam, 44 Pierrepoint Avenue, Potsdam, NY 13676,
obriennr@potsdam.edu

²Institute of Reservoir Characterization and School of Geology and Geophysics, University of Oklahoma, Norman, OK 73072

The fabric of shales revealed by x-radiographic, petrographic, and scanning electron microscopic analysis provides clues to shale sedimentary processes and properties of potential gas shales. Presented here are examples of fabric signatures useful in recognizing the following shale forming processes: 1) flocculation – dispersion, 2) bioturbation, 3) low density bottom flowing currents, 4) suspension settling, 5) bio-sediment aggregates and fecal pellet formation, and 6) lamination processes, esp. microbial mat formation.

In addition, microfabric analysis at the micrometer and nanometer scale using SEM, FESEM, and EDX techniques reveals various pore types found in certain gas shales. Examples are shown of these pore types: 1) porous floccules, 2) organo-porosity, 3) pores in fecal pellets, 4) pores in fossil fragments, 5) intraparticle pore spaces, 6) pores related to microchannels and microfractures. Examples typical of these processes and pore types are shown for various Devonian shales of the Appalachian Basin and the Barnett-Woodford gas shales and provide a useful pictorial frame of reference in Eastern Shale gas analysis.