

# **CLAY FABRIC – THE SIGNIFICANCE AND APPLICATION IN SCIENCES AND ENGINEERING**

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Clay Fabric, the spatial distribution, orientation, and particle-to-particle relationships of less than 4  $\mu\text{m}$  solid particles (mainly clay minerals) in fine-grained sediment, determines the characteristic of the microstructure and properties of sediments/soils, is of crucial importance in geology, mineralogy, biogeochemistry, and materials science. This paper presents unique novel methods and technologies of studying clay fabric and its various applications to geological, mineralogical, biogeochemical, soil science, and civil engineering research.

Clay particles and domains/assemblies especially smectite, have been investigated using TEM with special techniques. Samples from various depositional environments have been studied. Results of clay fabric TEM observation of marine sediments from Middle-America Trench, Mississippi Delta, Pacific Basin, California Continental Slope, and Baltic Sea revealed many characteristics of the depositional environment. Depositional environment, pore water geochemistry and biological/organic interactions play important roles in the formation and diagenesis of clay fabric and ultimately the fundamental sediment properties. Clay nanofabric synthesized and studied in the laboratory contributes to the understanding of the developmental history of clay fabric in natural environments and also provides useful and important applications in materials science and related disciplines.