
Characterization of Overgrowth Structures Formed Around Individual Clay Particles During Early Diagenesis

Michel Steinberg¹, Thierry Holtzapffel² and Michel Rautureau³

¹ Laboratoire de Géochimie, U.A. 723, Bat. 504, Université de Paris Sud 91405 Orsay Cédex, France

² Département de Géologie, Université d'Angers, 49000 Angers, France

³ Laboratoire de Cristallographie, U.A. 810, Université d'Orléans 455046 Cédex, France

Abstract: The coarse (0.4– 2 μm) clay fraction of an Albian black shale collected in the Atlantic Ocean (Deep Sea Drilling Project leg 11) consists chiefly (90– 95%) of smectite and 5– 10% illite. Both minerals are locally surrounded by overgrowth structures, such as fine laths about 0.05– 0.4 μm long and 0.02– 0.1 μm wide. Individual laths or assemblages of laths protrude from the center of smectite flakes at angles of about 60° to each other. Laths occur around illite crystals in a similar manner or coalesce into a rim that consists of 0.05– 0.1- μm -size particles. On the basis of scanning transmission electron microscopy: (1) the center of individual illite crystals consists of a dioctahedral mineral, but the overgrowth structures are Al-Fe beidellites; and (2) the smectite flakes have highly variable compositions, but correspond chiefly to Fe-Al-beidellite, whereas the overgrowths are compositionally close to montmorillonite.

The overgrowth structures seem to have formed during early diagenesis. The chemical composition of overgrowths around illite and smectite tend to be similar in response to the new environment, implying an addition of silica to both materials.

Key Words: Beidellite • Diagenesis • Illite • Montmorillonite • Overgrowths • Scanning electron microscopy

Clays and Clay Minerals; June 1987 v. 35; no. 3; p. 189-195; DOI: [10.1346/CCMN.1987.0350304](https://doi.org/10.1346/CCMN.1987.0350304)

© 1987, The Clay Minerals Society

Clay Minerals Society (www.clays.org)
