

Zonation of diagenetic calcite precipitated within chambers of the Cretaceous ammonoids

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Diagenesis of carbonate sediments has widely been observed in variety of sedimentary environment. In terms of preservation of fossils, diagenesis plays an important role, such as producing limestones, neomorphic replacement for preserving detailed morphology, etc. On the other hand, neomorphic replacement significantly alters original geochemical signatures on fossil materials, which sometimes disrupts paleoenvironmental analyses. From the other point of view, carbonate sediments precipitated through diagenesis record water chemistry of diagenetic environments.

We report geochemical signatures of diagenetic calcite precipitated within chambers of the Cretaceous ammonoids recovered from the Yezo Group distributed in Hokkaido, Japan. Each chamber observed is completely filled with calcite cements, which is distinguished into two zones from visual observation. Brownish yellow and clear colorless cements are precipitated on the inner surface of a chamber and a void space in the center of a chamber, respectively. The brownish yellow cements can be subdivided into four sub-zones, on the basis of visual and backscattered electron microscopic observations. Energy dispersive spectrometry for trace metal composition analyses indicates that Fe is the most abundant in the both brownish yellow and clear colorless cements. While Mg is less abundant in the brownish yellow zone, it is as abundant as Fe in the clear colorless zone. In both zones, Sr is not detected. These observations indicate that the brownish yellow and clear colorless zones were precipitated from formation water and meteoric water, respectively.

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