Ultra-microstructures of foraminiferal calcification observed using focused ion beam microscopy

Ultra-microstructures of foraminiferal calcification observed using focused ion beam microscopy

*長井 裕季子[1]、豊福 高志[2]
*Yukiko Nagai[1], Takashi Toyofuku[2]

1. 横浜国立大学大学院環境情報学府、2. 海洋研究開発機構
1. Graduate School of Environment and Information Sciences, Yokohama National University, 2. JAMSTEC

Foraminifera is unicellular organism with calcareous shells in ocean. The elemental composition of foraminiferal calcite is of great usage in paleoceanographic reconstructions. Even though, little is known regarding the governing biological processes of elemental uptake during calcification. The role of the organic templates are still unclear. This organic template separating the different layers of calcite that form the foraminiferal chamber wall. Further, although the function of this template is considered as crystal nucleation for chamber wall by previous studies, it is not well understood. In this study, we applied a focused ion beam (FIB) to the site of calcification of an *Ammonia* "*beccarii*"'s (benthic foraminifer) newly growing chamber to observe ultra-microscopic distribution of crystals on the organic template. Exposed cross sections of both soft and hard tissues allowing detailed time series observation of the site of calcification throughout process. We show numerous micro gaps of calcareous layers and internal appearance of organic structures are present within the site of calcification during calcification process. The series of SEM observations suggest that organic layers are actively involved in calcite precipitation. We provide the evidence that the site of calcification is enclosed from surrounding seawater during calcification. Our findings improve the understanding of foraminiferal biomineralization and characterize the conditions under which element partitioning and isotope fractionation occur.

キーワード：有孔虫、ミネラリゼーション、石灰化
Keywords: foraminifer, mineralization, calcification