

Estimation of foraminiferal calcification process from live imaging and FIB-SEM approach

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Calcareous foraminifera have been thought a major carbonate producer in ocean. Their tests (shells) are fundamental tools as paleo-environmental indicators in various studies because their calcareous tests have been archived as numerous fossils in sediment for geologic time and various environmental information are brought by faunal structure, shell morphology and geochemical compositions of calcitic test. The other hand, the calcification process itself is interested for us. Pseudopodia sticking out into sea water build organic templates in the form of chamber. Calcium carbonate is precipitated on the both side of template within several hours. Calcium and carbonate are fixed at there by foraminiferal biological process. The newly added chamber wall was flexible in a first day, the chamber solidified in a few days and became a solid test. It is very interesting to record this process in video. Our studies showed the variable change of pH and Ca during the biomineralization of foraminifera by the application of fluorescent indicators (e.g. Toyofuku et al., 2017). Recently, we also apply the method to clear cut the site of calcification under SEM by focused ion beam (FIB-SEM)(Nagai et al., 2018). The nano-scale fine structures have been revealed the distribution of soft organic structures (i.e. pseudopodia) and hard tissue (precipitated calcium carbonate) by this observation.

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