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Intracellular environment of carcaleous foraminifera and biomineralization

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Foraminifera are one of the most important calcium carbonate producers in marine environment and their tests are commonly used to reconstruct various studies of paleoceanography. Even the foraminifers are belonging to unicellular organism, they can precipitate a well-decorated precise test as multicellular organisms. Their calcification mechanisms should be supported by some ingenious biological activity, however little is known about the intracellular control on carbonate precipitation. In particular, knowledge about control of calcium and carbonate ion concentrations in foraminiferal cells are of great interest, since these may have implications for a broad field of studies in paleoceanography. Here, we open a small but obvious new window to understanding the biomineralization of foraminifera by the application of fluorescent indicators. The development of fluorescent indicators allow us to visualize the chemical environment (e.g. pH and calcium concentrations) in living foraminiferal cell. Observed results show that foraminifera realize their biomineralization by fine controlling of intracellular environments. We believe the accumulation of these knowledge make new perspectives about foraminiferal test chemistry as paleoceanographic proxy.

Keywords: foraminifera, culture, laboratory, calcification, ocean acidification, biomineralization