

Encapsulation of cells within Layer-by-Layer Shell

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Biological systems have evolved to protect themselves from external stress by employing mechanisms such as eggshells or immune camouflage. Earlier studies have suggested the formation of artificial shells which play a role as a biological system for cell protection by using a layer-by-layer technique. However, they were mainly limited to the encapsulation of a single cell. In this study, we propose a method to synthesize polymer microshell encased several living cells using the CaCO_3 as sacrificial templates. Cell surfaces, which have electronegative charges, act as sites of nucleation and crystal growth of CaCO_3 . The polymer microshell has free spaces in which individual cell can freely move by dissolving CaCO_3 . Through control of the concentration of CaCO_3 source and microalgae, the number of algae in the polymer shell and free space can be changed. Therefore, one can observe the cell behaviors such as cell division and cell viability of several cells under specific stimuli by confining several living cells to polymer shells.