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サイズ制御炭酸カルシウム化合物による血液凝固特性
Blood coagulability characteristics of size controlled calcium carbonate composite

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Some researchers have investigated that calcium ions are required for blood coagulations. Calcium ions participated in hemostatic phase and accelerated forming of blood clot. It has a role conversion of prothrombin to thrombin. Thrombin acts as a serine protease that converts soluble fibrinogen into insoluble strands of fibrin, as well as catalyzing many other coagulation-related reactions. Fibrin forms blood clot.

In this study, we focused on calcium carbonate and helpful materials for blood coagulations. However, natural cuttlefish bone is hard to control its particle size. Therefore, in order to control the size and surface structure, we synthesized artificial calcium carbonate with using sodium alginate and β-chitosan as the enhancement materials for blood coagulations. To improve specific surface area, using by dimethyl carbonate (DMC) and calcium chloride ($CaCl_2$), we synthesized smaller $CaCO_3$ than ordinary $CaCO_3$. And then, sodium alginate and β-chitosan are coated alternately on the prepared calcium carbonate by layer-by-layer self-assembly method. Due to its high biocompatibility, β-chitosan has been employed in wound healing management and drug delivery system. And alginate has also wound healing property. SEM image of $CaCO_3$ is shown in Figure 1. As shown in the figure1. Size controlled $CaCO_3$ was 4times smaller than that of ordinary $CaCO_3$. Size controlled $CaCO_3$ has big specific surface area. The composite calcium carbonate was also characterized by XRD, UV-vis Spectrophotometer for blood coagulability. As the result, it was found that the composite calcium carbonate has effect on blood coagulations. We consider that this is owing to the high surface area of the fabricated structure with $CaCO_3$.

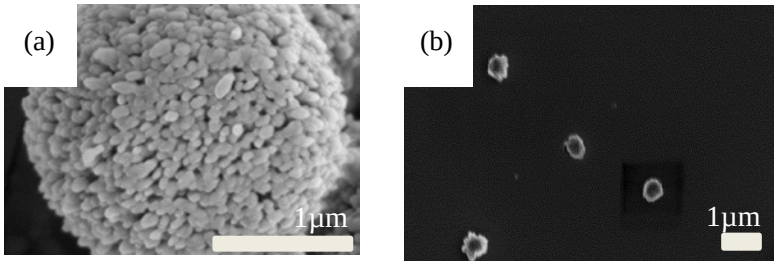

Figure 1. FE-SEM image (a) Ordinary $CaCO_3$, (b) Size controlled $CaCO_3$

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