Development of Analytical Methods Using Precision Designed Minute Structures

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Although biomolecules are very small (nm-sized), they are involved in a variety of biological functions with high efficiency and selectivity. Therefore, biomolecule is one of the ideal nanomolecules. Hydrogel prepared from alkoxysilane contained similar water content to the living body, and the encapsulated biomolecules maintained their functions for a long period within the hydrogel. We developed separation columns and enzyme assay methods by immobilizing these biomolecules within the gel.

Recently many minute structures were produced by self-organization reaction. The self-organization reaction was a promising procedure for the preparation of the minute structures. Therefore we tried to develop superior analytical systems using these minute structures. The skeleton and pore sizes of the porous silica were tunable by the reaction. We prepared porous silica with different skeleton and pore sizes and used the porous silica for the support of functional materials.

Short analysis time and reduction in sample size were achieved by using these designed minute structures. We expected that these structures could be applicable to many fields, because we can immobilize a variety of compounds and can produce many minute structures.