Technical Subject:

Exploring artificial proteins that control synthesis of nanostructured inorganic crystals

Corresponding Applicant: **Kiyotaka Shiba** (Japanese Foundation for Cancer Research)

Co researcher: Hiroaki Saito (Japanese Foundation for Cancer Research),
Kenji Kashiwagi (Japanese Foundation for Cancer Research)

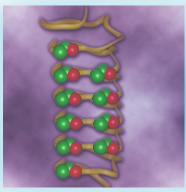
Nano-biotechnology

Controlled synthesis of nanostructured inorganic crystals by artificial proteins

MolCraft

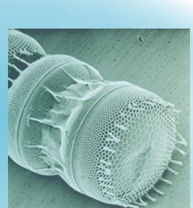
The recently established, novel protein engineering system, in which a single designed microgene is tandemly polymerized to create repetitious proteins.

NGDNGNNGY
NGDNGNNGD
---NGNNSY
NGDNGNNGV
---NGNNGY
NGDNGNNGD
---NGNNGY
NGDNGNNGD
---NGNNGE
---NGNNGE
---NGNNGE
---NG



Information on structures of natural proteins that direct mineralization reactions

Biomineralization: complex biomcomposites, such as abalone shell, bone, and teeth



The interface between biology and solid state physics has recently come into the spotlight as one of the most relevant areas of research in nano-biotechnology. Natural proteins direct many of the mineralization reactions that eventually result in the formation of complex biocomposites, including abalone shell, bone and tooth. The technological utilization of biomineralization systems wherein proteins regulate and modify inorganic solid phase structure is expected to play pivotal role in the "Bottom-up" approach of nano-biotechnology.

Here we explore artificial biomineralization proteins using our recently established, novel protein engineering system. In this system, we first embed combinations of functional motifs found in natural biomineralization proteins into "microgenes," then create repetitious artificial proteins through polymerization of these microgenes. An iterative approach involving design, creation and evaluation will establish the most versatile system for crystal engineering.