

Name KAMADA Kai	Job Title Associate Professor	Area of Expertise Inorganic Materials
1. Main Research Topics Current research focuses on the functionalities of low-dimensional ceramics (nanodots, nanowires, nanosheets), with particular emphasis on the synthesis and synergistic functions of inorganic–bio hybrid materials. In particular, we aim to create novel composite materials by chemically or physically combining ceramic nanoparticles (as inorganic components) with functional proteins such as enzymes (as biomolecular components). Our goal is to develop materials that integrate the mechanical robustness of ceramics with the precise functionalities of biomolecules, and to construct innovative reaction systems that utilize energy transfer (light or heat) between inorganic materials and biomolecules within the composites. Additionally, we are developing new antibacterial and antiviral coating materials that leverage the bactericidal effects derived from the anisotropic shapes of two-dimensional sheet-like ceramics. ① <u>Photo-assisted activity control of enzyme bound to layered semiconductor</u> A method has been developed to control the catalytic activity of enzymes bound to layered semiconductors by irradiating the semiconductor with light energy and transferring that energy to the enzyme. This is proposed as a novel approach to enzyme activity regulation. ② <u>Photocatalytic reaction of semiconductor using light energy emitted by photoenzyme or photoprotein</u> By binding semiconductors to luminescent enzymes or proteins, I am developing a new photocatalytic system that does not require external light sources, using the light energy emitted by these biomolecules to excite the semiconductor. ③ <u>Antibacterial or antiviral coating materials based on layered ceramics</u> Two-dimensional sheet-like layered ceramics possess rigid and extremely sharp fragments. I am developing liquid-based materials that form antibacterial or antiviral films by leveraging the physical impact of these fragments on microbes and viruses.		
2. Keywords Low dimensional nanostructured ceramics, inorganic-bio hybrids, antibacterial/antivirus coating		
3. Remarks and Websites researchmap : https://researchmap.jp/7000002048 Laboratory : https://www.cms.nagasaki-u.ac.jp/lab/nanokaimen/		