

**Graduate School of Science and Technology, Kumamoto University
&
Nanosheets and Their Physicochemical Properties**

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In the first part of the talk, Kumamoto University and Graduate School of Science and Technology (GSST) will be introduced. Kumamoto University has mainly seven faculties and six graduate schools. GSST consists of eight and five fields in Master's and Doctoral courses, respectively. Some unique educational programs and researches in GSST will also be presented.

In the second part, the research about "Nanosheets" which has been carried out in my laboratory will be presented. Nanosheets prepared by exfoliation from some layered oxides are single crystals with 0.5-1.2 nm in thickness, and have quantum size effects as a matter of course. We have discovered some unique properties as follows:

1) Simple electrochemical reaction of Ag^+/Ag in the interlayer

The intercalated Ag^+ ion is easily reduced to Ag atom without crystallization in the nano-space interlayer.

2) Photoelectrochemical reaction at nanosheets

Charge separation driven by illumination is relatively large, leading to a large photocurrent for methanol oxidation. The photo-produced electron moves in the Ti^{4+} network in Ti-O nanosheet, while the photo-produced hole exists at the surface O^{2-} ions.

3) Photoluminescence of lanthanide ions in nanosheets

Water molecule promotes the emission of Eu^{3+} in Ti-O nanosheet, which is based on energy transfer from band gap excitation in semiconductive nanosheet to the Eu^{3+} . Multi layered oxide films can be easily prepared by Layer-by-Layer assembly technique, and the color of the film can be controlled by introducing different lanthanide cations into the interlayer. In addition, other unique photoluminescence behavior will be presented.