

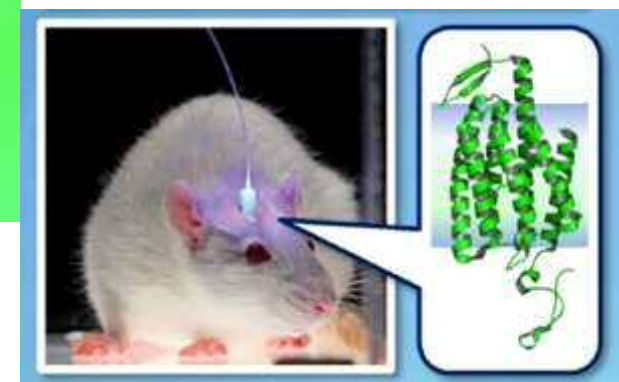
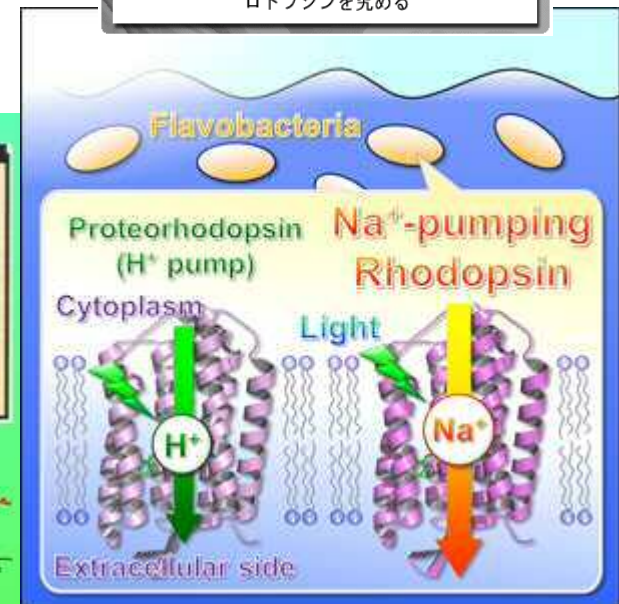
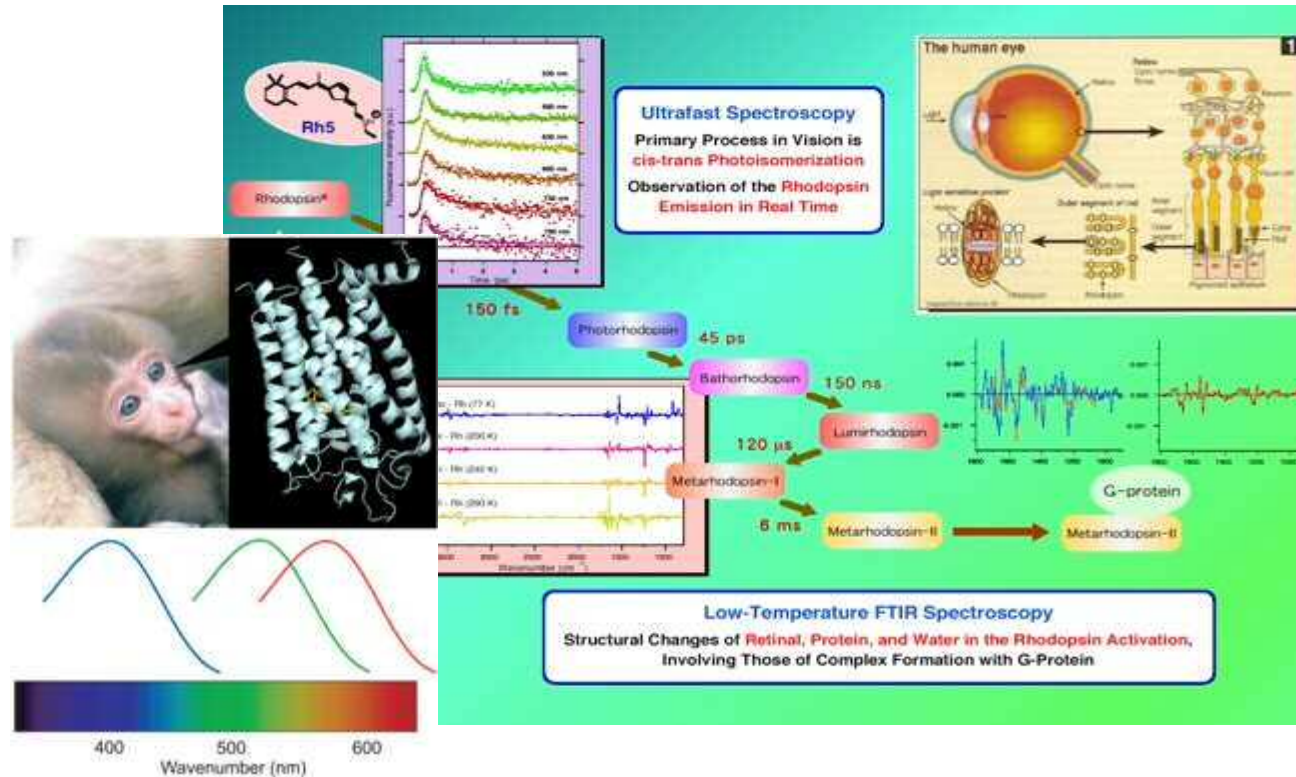
---

# Life Science

---

# Prof. Hideki Kandori Lab: Study on Light & Life

神取研究室  
ロドプシンを究める



Using state-of-the-art spectroscopy, Kandori Lab revealed structural changes of photoreceptive proteins. New functions have been created from such basic results, which are applicable to life science field.

Nature (2015); Angew (2015); JACS (2015); Chem. Rev. (2014); JACS (2014); PNAS (2013); Nat. Commun. (2013).

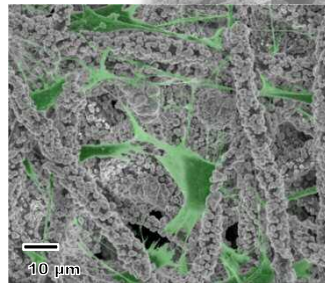
# Organic – inorganic hybrid/composite materials with cotton-wool-like structure for bone regeneration

Prof. Toshihiro KASUGA, Assoc. Prof. Akiko OBATA, Assoc. Prof. Hirotaka MAEDA

The aim of this project is to develop biomaterials with high bone-forming ability and flexibility to achieve an easy implant-surgery for the use in bone regeneration. A novel hybrid/composite material consisting of biodegradable polymer,  $\text{CaCO}_3$  and silica has been developed and shaped into a cotton-wool-like structure. This material provides calcium ions which are one of the essential elements for bone formation in body and also releases a trace amount of silicate ions to stimulate osteogenic cells' functions and to enhance the bone regeneration.

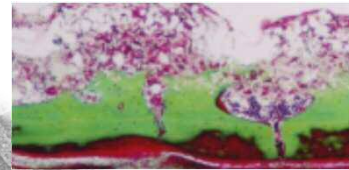
## Cotton-wool-like material

This material shows flexibility and contains lots of pores inducing the cell migration into its inside.



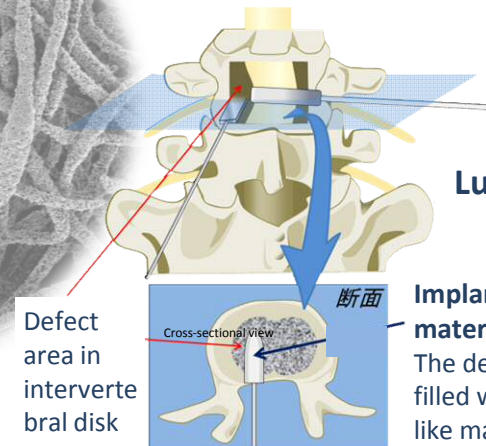
SEM image of osteoblast-like cells in the material (Green ; cells)

The cells migrate and proliferate inside of the material.



Cross-sectional image of the material after 12w-implantation in a bone defect with 8mm in size at a rabbit calvarium (Green; mineralized tissue)

New bone was formed inside of the defect filled with the material. This defect is not spontaneously recovered without materials.



Lumbar

## Implantation of the material

The defect can be completely filled with the cotton-wool-like material.

An example of applications of this material

## References:

- [1] J. Wang, P. Zhou, A. Obata, J.R. Jones, T. Kasuga, *Materials*, **8**, 7979-7987 (2015).
- [2] T. Kasuga, A. Obata, H. Maeda, Y. Ota, X. Yao, K. Oribe, *Journal of Materials Science: Materials in Medicine*, **23**, 2349-2357 (2012).
- [3] A. Obata, T. Hotta, T. Wakita, Y. Ota, T. Kasuga, *Acta Biomaterialia*, **6**, 1248-1257 (2010).