GS1-4 Photothermal therapy of cancer using gold nanorods

◯Akira OHGA[1], Tsuyoshi ANDO[1], Yasuyuki AKIYAMA[1], Takeshi MORI[1,2], Yoshiki KATAYAMA[1,2], Yasuro NIIDOME[1], Takuro NIIDOME[1,2,3]

[1]Fac. Eng., Kyushu Univ., [2]Cent. Future Chem., Kyushu Univ., [3]PRESTO, JST

Gold nanorods, rod-shaped gold nanoparticles, show surface plasmon band in near infrared region and efficient photothermal effect. The near infrared region (650 – 900 nm) is ideally suited for *in vivo* imaging and therapy due to minimum light absorption by intrinsic chromophores, hemoglobin, and water. Therefore, applications of the gold nanorods in the field of lifescience are expected. However, since cationic detergent acting as a stabilizer of the gold nanorods has strong cytotoxicity, we couldn't apply them for the applications.

In this study, to solve this problem, the gold nanorods were modified with polyethyleneglycol (PEG) chain. The PEG-modified gold nanorods showed little cytotoxicity *in vitro* and high stability in the blood. Near infrared laser light was irradiated to tumors in mice after direct injection of the PEG-modified gold nanorods. As a result, the tumor growth was significantly suppressed. However, in the case of intravenous injection, the suppression effect of the tumor growth was weaker. To improve the effect, the gold nanorods should be targeted into the tumor. Here, we tried to develop a targeted delivery system using peptide-modified gold nanorods. A substrate peptide for a tumor-specific protease was modified with PEG chain, then, the PEG-modified peptides were bound on surface of the gold nanorods. Since the protease specifically expresses in the tumor, the PEG-peptide-gold nanorods would accumulate in the tumor due to the release of PEG triggered by the site-specific enzyme activity.