News Release

芝浦工業大學
SHIBAURA INSTITUTE OF TECHNOLOGY
Established 1927

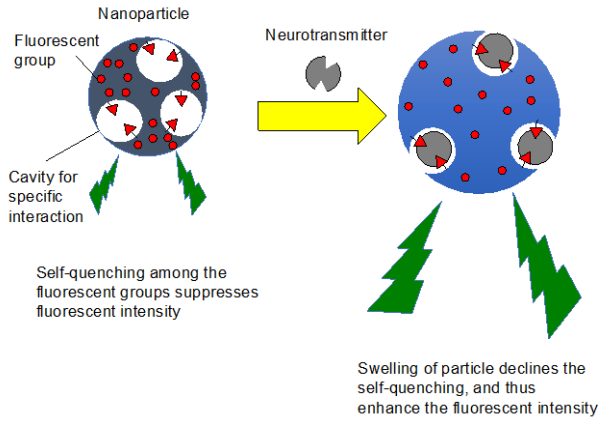
10/24/2018

Imaging Technology Using Plastic Nanoparticles for Visualizing Neurotransmitter Secretion in Living Brain

Prof. Yasuo Yoshimi of the Department of Applied Chemistry, Shibaura Institute of Technology, with the cooperation of Prof. Tatsumi Nagahama (Teikyo Heisei University) and Mr. Takashi Inutsuka and his coworkers (Pharmacological Evaluation Institute of Japan), has developed imaging technology for visualizing neurotransmitter secretion in the living central nervous system.
This new technology, which utilizes fluorescent polymer nanoparticle probes imprinted with the target neurotransmitter, will enable the unraveling of the mechanism of information processing in the brain as well as the development of therapies for cranial nerve diseases.

【Presentation】 Annual Meeting of Society for Neuroscience (Neuroscience2018)
https://www.sfn.org/Meetings/Neuroscience-2018
【Date】 Nov. 3rd ~7th **【Venue】** San Diego Convention Center, U.S.A.

It has been well-known since the middle of the 19th century that neurotransmitters (e.g., serotonin, dopamine, and glutamate) function as chemical messengers between neurons and play important roles in information processing in the brain. However, until now, no technology has been developed for detecting the secretion of neurotransmitters in living brain.
Prof. Yoshimi's laboratory synthesized fluorescent nanoparticles in which the molecular structure of serotonin was imprinted. The nanoparticles swell when they interact specifically with serotonin, resulting in enhanced fluorescence signals. By simple soaking, the nanoparticles can stain the brains of *Aplysia* slugs that live in reefs. Fluorescent image of the stained neurons was obtained by a microscope with a camera which has high resolutions of time and of fluorescent intensity. A remarkable increase in fluorescence intensity was observed when the serotonin was secreted at the specified spot. The increase in fluorescence intensity became more noticeable after administration of an antidepressant (monoamine oxidase inhibitor), as an inhibitor of the enzyme which removes the surplus serotonin in brain.
Prof. Yoshimi is planning to expand the repertoire of nanoparticles for detecting the secretion of other neurotransmitters (dopamine, acetylcholine, and GABA, etc.) to enable further studies on the mechanisms of brain functions, including learning and memory, and the development of new therapeutic technologies for cranial nerve diseases.
This research will be presented at the Annual Meeting of the Society for Neuroscience (November 3 – 7, San Diego).



neurotransmitter by a fluorescent nanoparticle

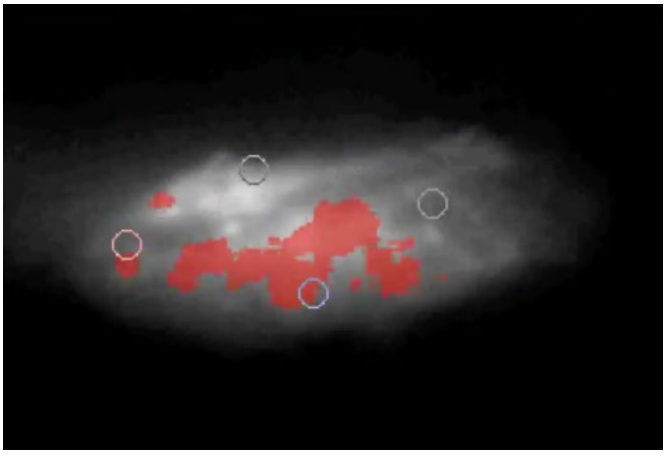


Fig. 2: An example of the fluorescent image indicating serotonin secreted from neurons of sea slug microbrain stained by the serotonin-imprinted nanoparticles

Contact : Shibaura Institute of Technology, Planning and Public Relations Section (written by TSUCHIYA)
3-9-14 Shibaura, Minato-ku, Tokyo 108-8548
TEL : 03−6722−2900 FAX : 03−6722−2901 E-mail : koho@ow.shibaura-it.ac.jp