

# 4<sup>th</sup> RAP Seminar

The 4th Seminar on RIKEN Center for Advanced Photonics

Language: Japanese

Date : **Sept.13(Fri), 2013, 15:00 ~ 16:00**

Location : Cooperation Center, 3F, W319, Wako Campus, RIKEN  
(理研 和光キャンパス 研究交流棟3階会議室 W319)

Title : **Mindscope: Device for physical observation of the mind**  
マインドスコープ: 精神の物理的観測装置

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Knowing the human brain, and furthermore the human mind, is directly linked to knowing the human being. As stated by René Descartes, "I think, therefore I am," and Blaise Pascal, "Man is a thinking reed," thinking is the primary function of human brain.

Scientific technology is essential to acquire new knowledge. The history of human knowledge shows that the development of the telescope helped develop astrology and physics and the development of the microscope contributed to the progress of biology, medical science and chemistry. Moreover, the progress of science led to new information communications technology (ICT). The issue for the near future is the development of the mindscope in a broad sense, or a noninvasive brain function imaging technology to understand the human mind. This is expected to contribute to the progress of mind science, which includes psychiatry; the humanities including philosophy, ethics and linguistics; and the social sciences including economics [1].

No natural substances with a maximum light absorption peak exist at the wavelength (approx. 800 nm) that is between the wavelength at which electronic transitions occur via the interaction of atoms with photons and the wavelength where the rotation and/or vibration of molecules occur. Optical topography uses the wavebands within living bodies' atmospheric transmission windows and the wavelengths close to the isosbestic points that are located at the skirts of light absorption points of oxidized or deoxidized hemoglobin. Optical topography and functional magnetic resonance imaging (fMRI) complement each other. There is a possibility that they could function as mindscopes [2].

Recently, research centers of philosophy and economics have begun to hold international conferences regarding noninvasive brain function imaging. Furthermore, in the healthcare field, optical brain function imaging is used in examinations related to the health of the mind particularly in the psychiatric clinical phase. Efforts are ongoing to use this technology to assist with psychiatric diagnoses for "Advanced Medical Treatments (by the Ministry of Health, Labour and Welfare)" [3-4].

## References

1. Koizumi, H. (2012). Brain-science and education in Japan. In S. Della Sala & M. Anderson, (Eds.), Neuroscience in education. Oxford, U.K.: Oxford University Press.
2. Koizumi, H. (2008). Developing the brain: A functional imaging approach to learning and educational sciences. In A. Battro, K. Fischer, & P. Lena (Eds.), The educated brain. Cambridge, U.K.: Cambridge University Press.
3. Takizawa, R., Fukuda, M., Kawasaki, M., Kasai, K., Mimura, M., Shenghong Pu, Noda, T., Niwa, S., Okazaki, Y. (2013). Neuroimaging-aided differential diagnosis of the depressive state, *NeuroImage*, S1053-8119 (13) 693-3.
4. Sato, H., Yahata, N., Funane, T., Takizawa, R., Katura, T., Atsumori, H., Nishimura, Y., Kinoshita, A., Kiguchi, M., Koizumi, H., Fukuda, M., Kasai, K. (2013). A NIRS-fMRI investigation of prefrontal cortex activity during a working memory task, *NeuroImage*, 83C: 158-173.

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