

**Title:**

Mechanisms of background segregation and source localization of odors

**Organizers:**

Brian H Smith, School of Life Sciences, Arizona State University

Takeshi Sakurai, Research Center for Advanced Science and Technology (RCAST), The University of Tokyo

**Symposium Theme:**

Sensory systems have evolved to function within the statistical structure of their natural environments. We understand these adaptations quite well in visual, auditory and somatosensory processing. In contrast, we lack a similar understanding in olfaction with its particular challenges of turbulent plumes that mix odors from different sources. The temporal structure of plumes originating from single odor sources has been well studied. But the temporal structure of plumes that consist of multiple odorants from different sources has not yet been established. Furthermore, an animal's ability to employ different strategies for detecting relevant odors and separating them from irrelevant background is only beginning to be understood. Several recent studies show that animals employ multiple mechanism on different timescales, and altogether these new studies contradict the common notion that olfaction is slow. Therefore, the timescale of temporal information in multi-odor plumes and the timescales used by the brain to make sense of the information in the environment need to be reassessed. In order to understand mechanisms of odor-background segregation, a systems approach involving close integration of experimental, theoretical and engineering approaches is essential. We propose a symposium for ISOT 2016 that will bring together four research groups that have made important contributions to understanding how both insect and mammalian sensory processing and early processing in the brain solve this important problem of odor-background segregation. There are different ways of solving the problem, for example, by evolving dedicated processing pathways for odors that have special meanings, such as semiochemicals (Kobayakawa). Olfactory systems can use fast temporal stimulus cues (Szyszka) and analytic processing of odor mixtures (Murthy) for odor-background segregation. Sensory processing in the brain can also pick out important components via a form of retuning (Riffel). Talks will present comprehensive, emerging evidence of how odor-background segregation is accomplished through a variety of means in insects and mammals. It will therefore be of interest to a broad community of researchers at ISOT.