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Biomimetic odorant sensors using insect olfactory receptors to classify unknown volatile chemicals

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Insect has a highly sensitive and accurate discrimination capacity for sensing odorants in the environment. However, its olfactory system is much simpler than mammalian's. The insect olfactory receptor (Or) proteins can be directly gated by odorants, and may not require any co-expression of downstream signaling molecules. Therefore, insect Ors hold great promise as detectors in a biosensor for detection of volatile chemicals. Among insects, the olfactory system of *Drosophila* is presently the best characterized one. Several important Or genes in *Drosophila*, which respond to explosive vapor or related precursors such as PTEN and 2-ethyl-hexanol, have been reported. The present work screened and selected Or genes which are sensitive to explosive vapor and related precursors by calcium imaging and electrophysiological techniques. Furthermore, a biomimetic odorant sensor which co-expresses these Or genes and a companion receptor Or83b in living cells is being constructed, in order to classify unknown volatile chemicals and detect specific types of illicit substances. This study provides an alternative way for odorant sensors' construction, comparing to the traditional electronic noses which are not as sensitive and accurate as natural noses, and would promote the development and application of biomimetic odorant sensors in a range of applications such as security and environmental monitoring.

Biography

Yan Liu has completed her joint Ph.D at 2011 from Tsinghua University. During her Ph.D, she got a national scholarship and studied in University of Wisconsin at Madison for two years. Her Ph.D research mainly focused at neuroscience field, especially the study of functions of ion transporters in cerebral ischemia. She has published 7 papers in reputed journals. She now works as Research Associate in National University of Defense Technology. Her main research interests include olfaction studies, biomimicry and sensors.

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