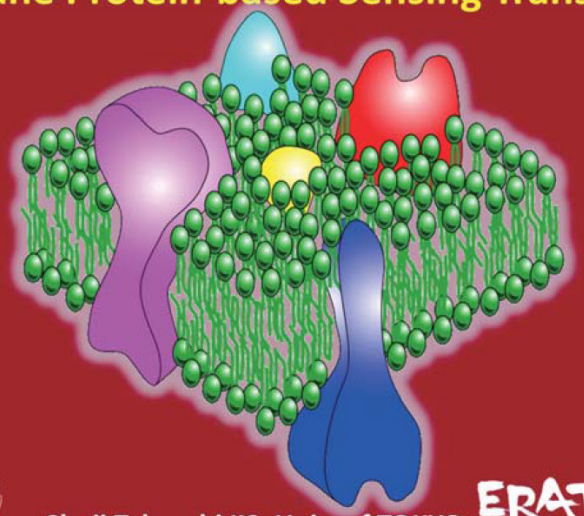
TSensors Summit San Diego 2014 -11-12

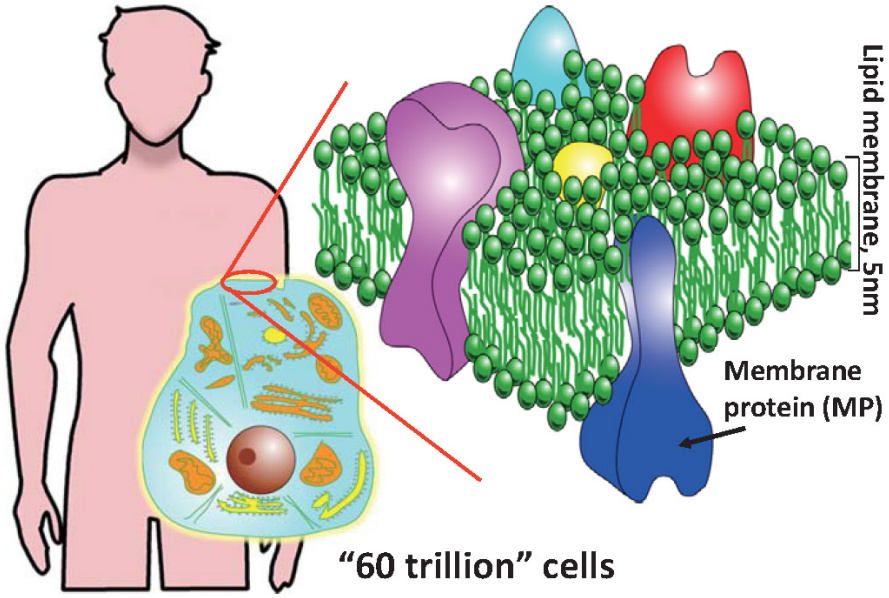
Highly Selective and Sensitive Membrane Protein-based Sensing Transistors



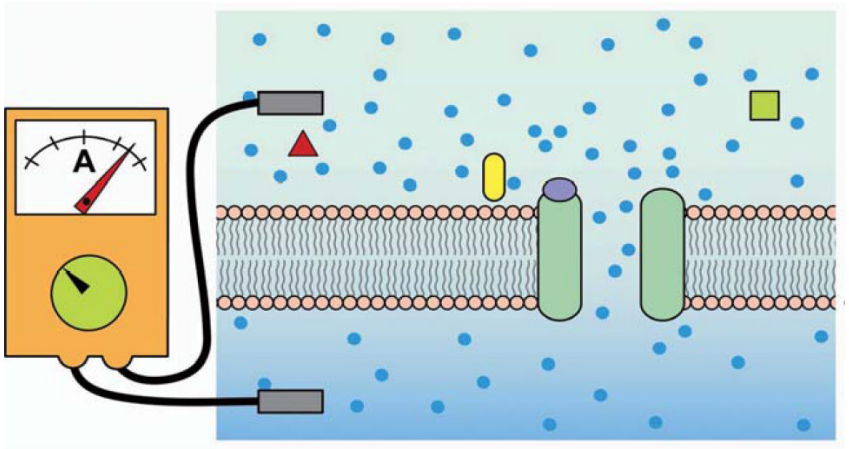
Shoji Takeuchi IIS, Univ. of TOKYO

ERATO

Tsensors in our body

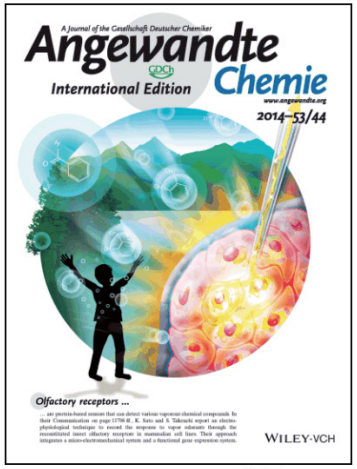


Ion channels are ultimate biosensors

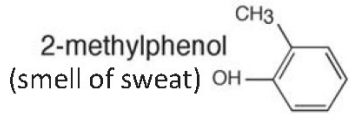


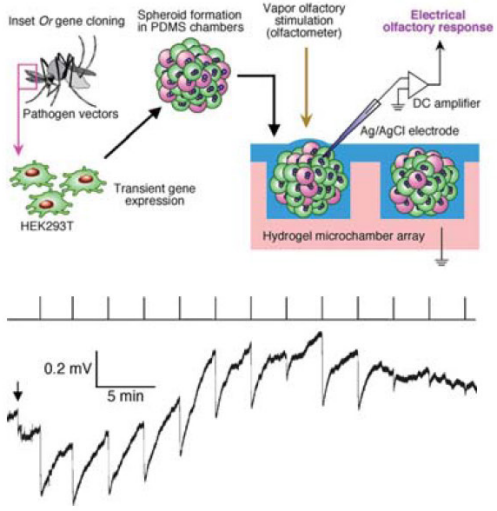
Single molecule → 10^7 molecules !

Cell sensors (Odorant sensors)



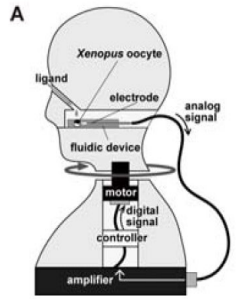
2-methylphenol (smell of sweat)

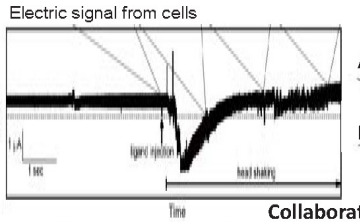


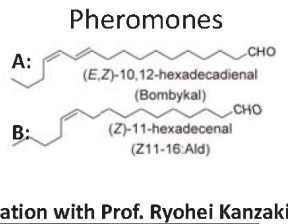


Angew. Chem. Int. Ed. 2014

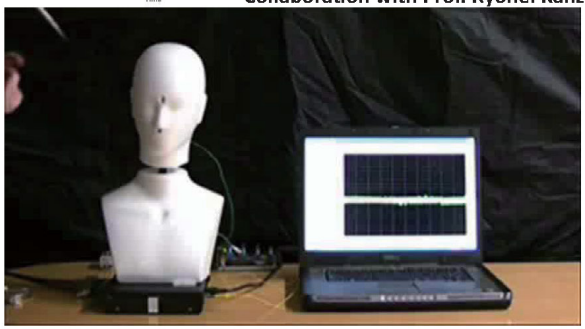
Highly selective odorant sensors using ion channels





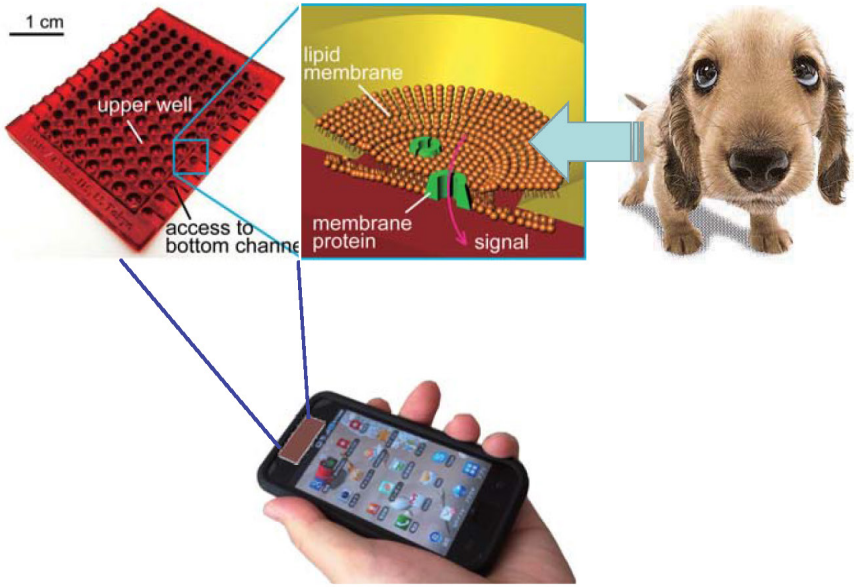


Collaboration with Prof. Ryohei Kanzaki

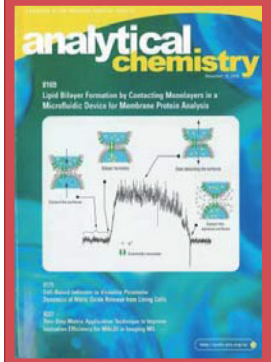


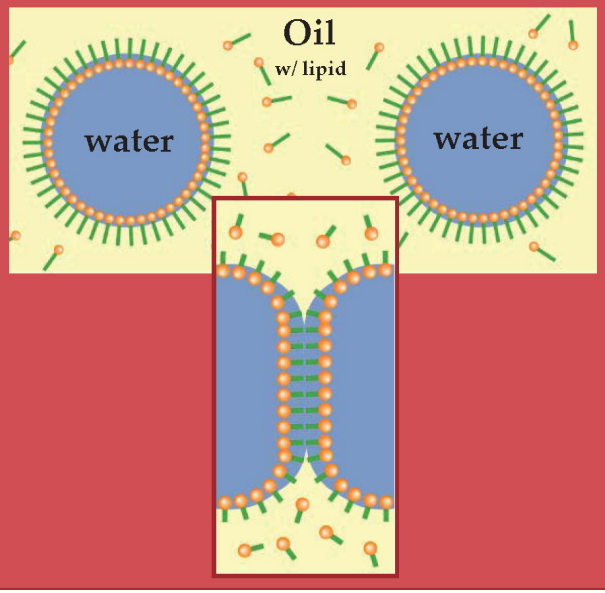
PNAS (2010)

Membrane protein sensors on a portable device

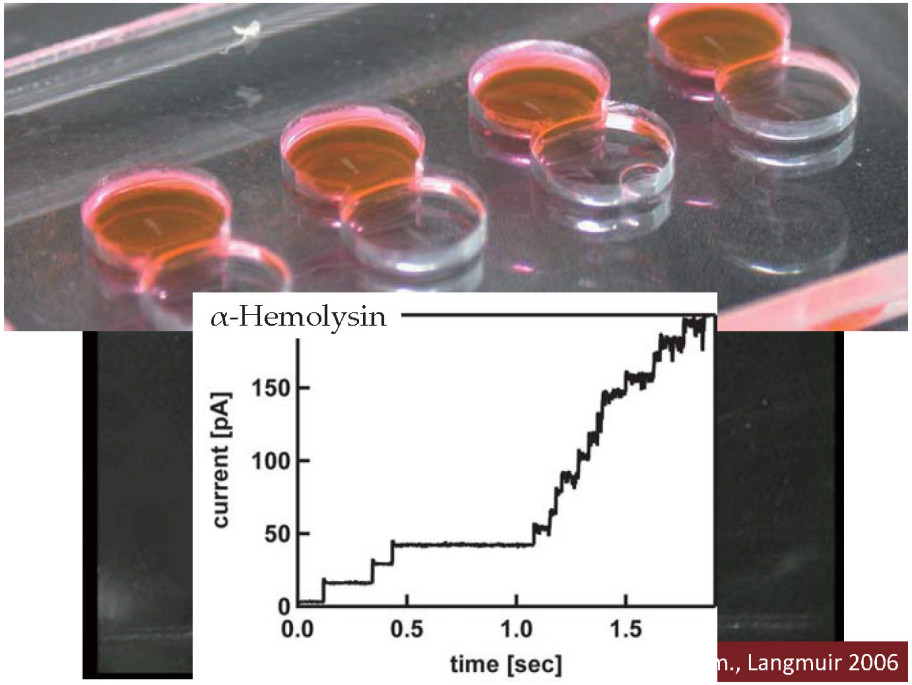


Lipid Monolayer Contacting Methods (2006)

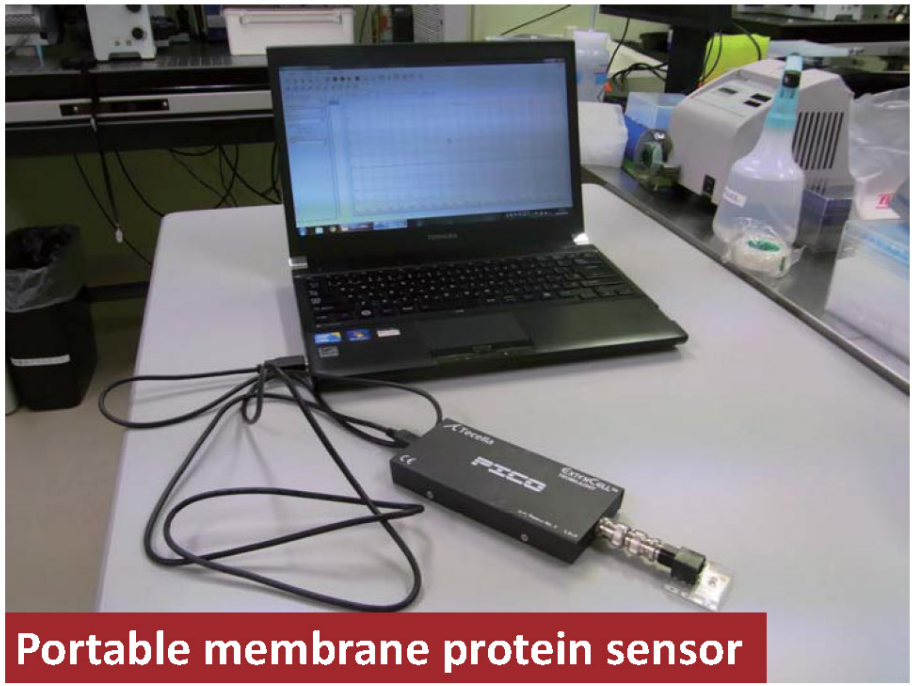




Analytical Chem. 2006



n., Langmuir 2006

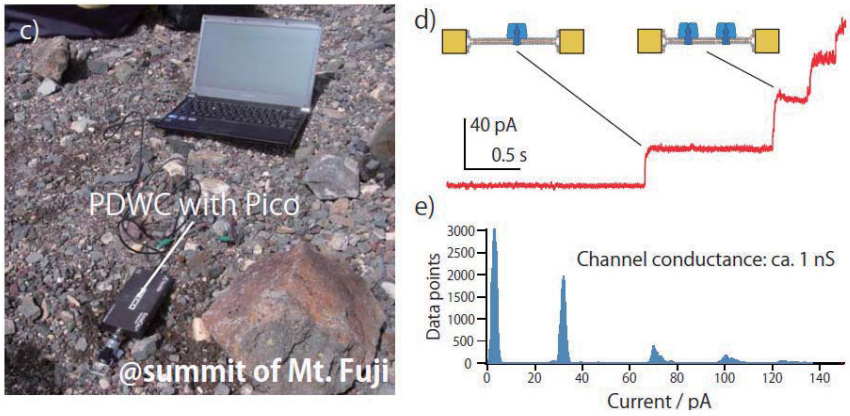


Portable membrane protein sensor

Measurement at Mt. Fuji

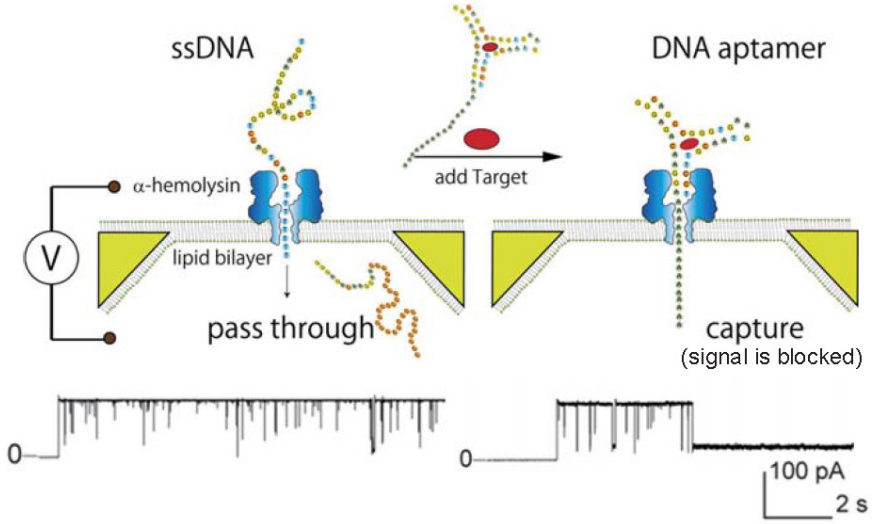
2011-8-11

Channel recordings at Mt. Fuji



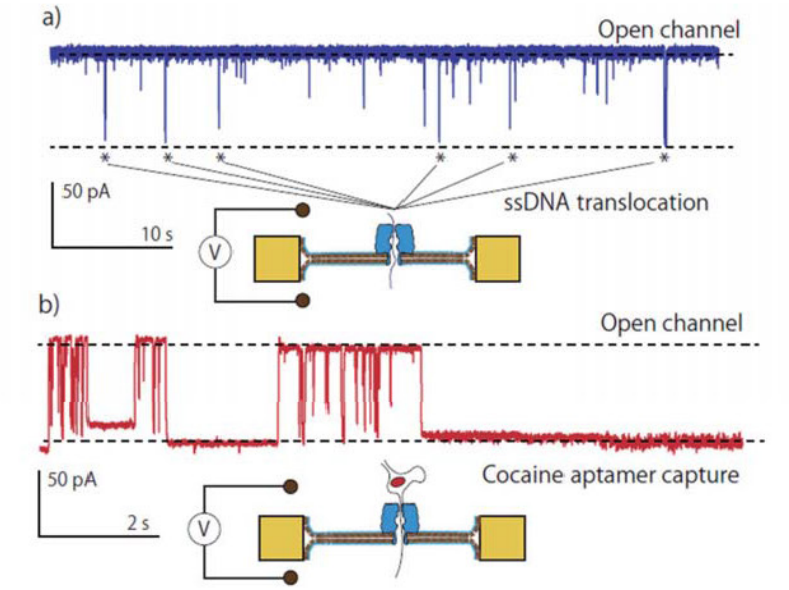
PLOS ONE 2014

Cocaine detection with DNA aptamers

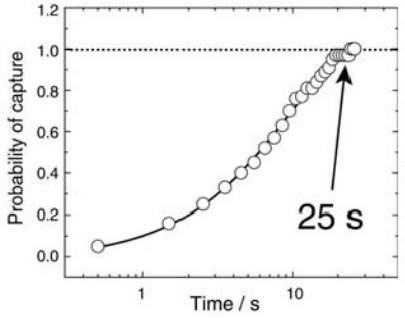


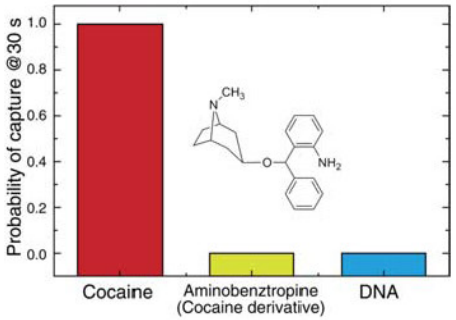
J. Am. Chem. Soc., **2011**

Cocaine detection with DNA aptamers



Cocaine detection with DNA aptamers





Fast detection!

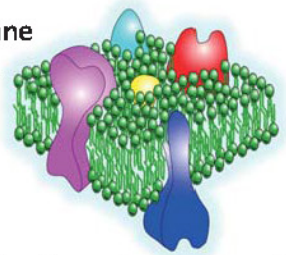
3 ppm for 25 seconds
0.3 ppm for 60 seconds
..... 1 ppb for 10 min!?(estimation)

High selectivity

J. Am. Chem. Soc., **2011**

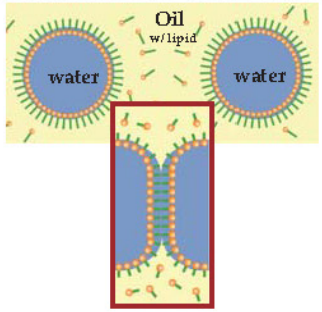
Summary: membrane protein sensors

Membrane proteins



Portable membrane protein sensor

Artificial cell membrane formation



Cocaine sensing