

TAKEUCHI LAB.

[Bio/Nano Hybrid Systems]

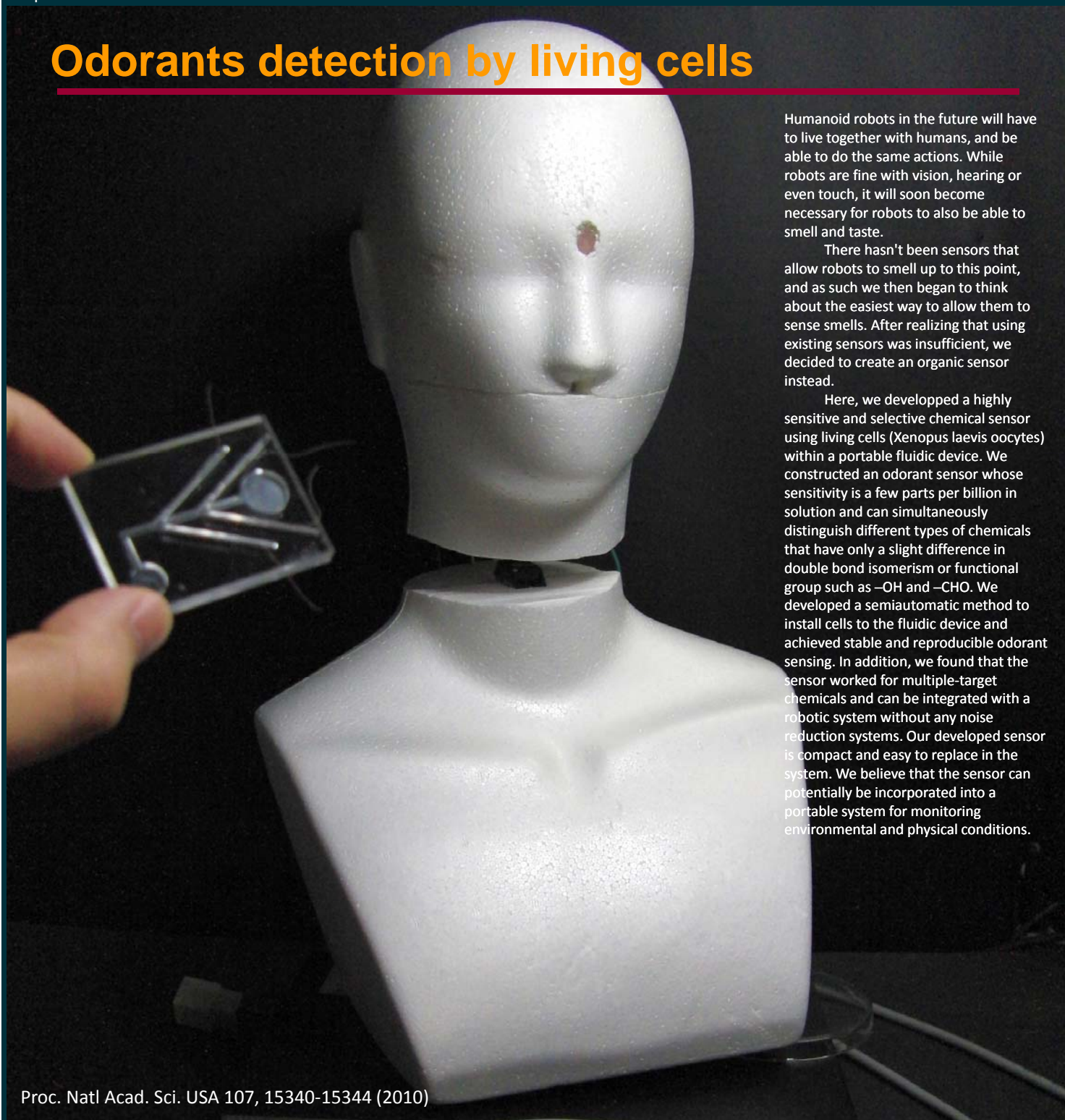
Centre for International Research on MicroNano Mechatronics

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Mechano-
Informatics
Department

Biohybrid sensors

Odorants detection by living cells



Humanoid robots in the future will have to live together with humans, and be able to do the same actions. While robots are fine with vision, hearing or even touch, it will soon become necessary for robots to also be able to smell and taste.

There hasn't been sensors that allow robots to smell up to this point, and as such we then began to think about the easiest way to allow them to sense smells. After realizing that using existing sensors was insufficient, we decided to create an organic sensor instead.

Here, we developed a highly sensitive and selective chemical sensor using living cells (*Xenopus laevis* oocytes) within a portable fluidic device. We constructed an odorant sensor whose sensitivity is a few parts per billion in solution and can simultaneously distinguish different types of chemicals that have only a slight difference in double bond isomerism or functional group such as $-OH$ and $-CHO$. We developed a semiautomatic method to install cells to the fluidic device and achieved stable and reproducible odorant sensing. In addition, we found that the sensor worked for multiple-target chemicals and can be integrated with a robotic system without any noise reduction systems. Our developed sensor is compact and easy to replace in the system. We believe that the sensor can potentially be incorporated into a portable system for monitoring environmental and physical conditions.