



GOLDEN BRAIN

IST – 510574

Development of novel concepts for
communication between living cells and
silicon-based electronic devices

Dr. Wolfgang Eberle, IMEC
Nov 14, 2007 - Canary Islands

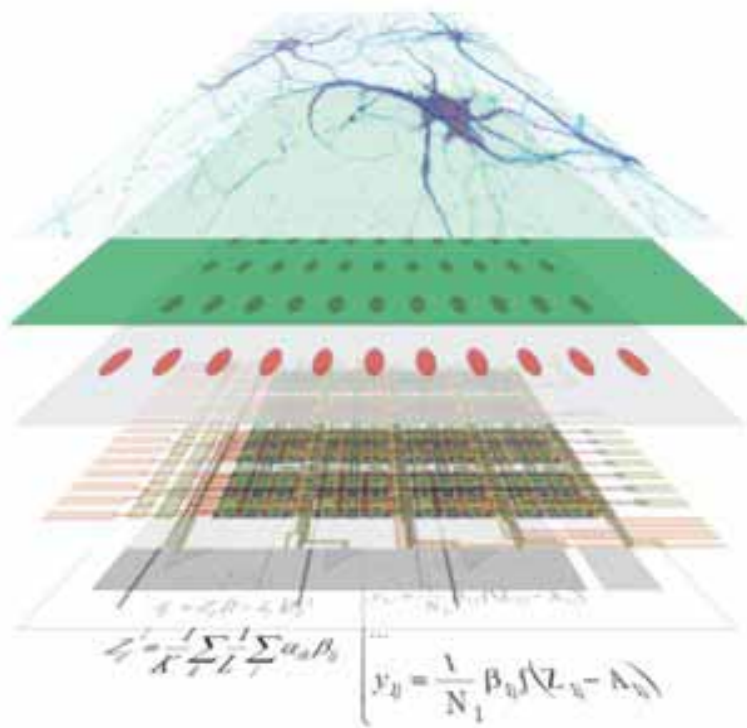


HUJI





Development of novel concepts for communication between living cells and silicon-based electronic devices



Participants

IMEC vzw
The Hebrew University of Jerusalem

- Biology
- Chemistry
- Applied Physics

Pepscan Systems B.V.

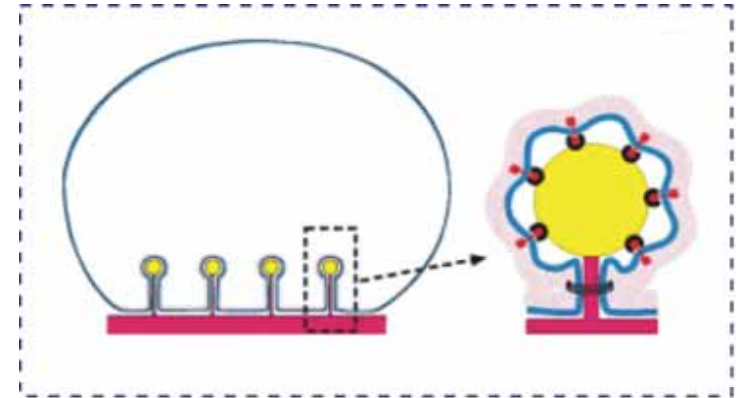
Belgium
Israel

The Netherlands

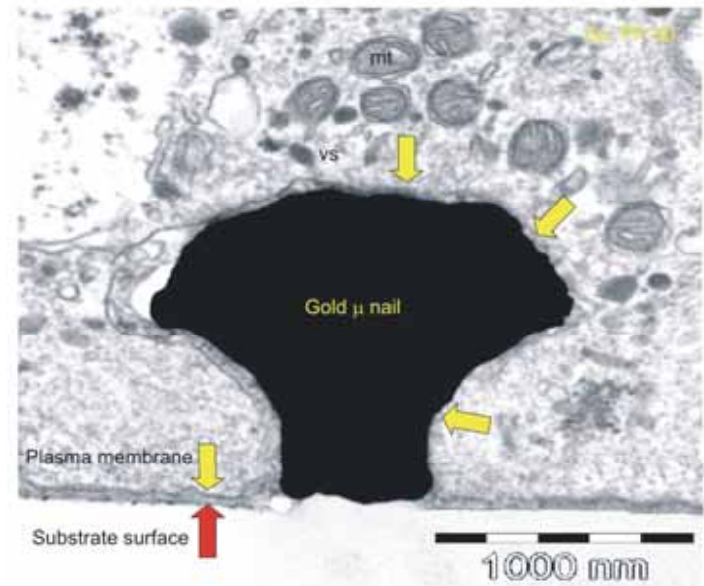


Work packages

- μ -nails and CMOS integration technologies
- Surface chemistry and biologization: model systems and implementation on μ -nails
- Neurotransmitter sensing: novel receptor mediated sensors
- Neuron guidance and confinement structure
- 'Nailed'-neurons – technology validation

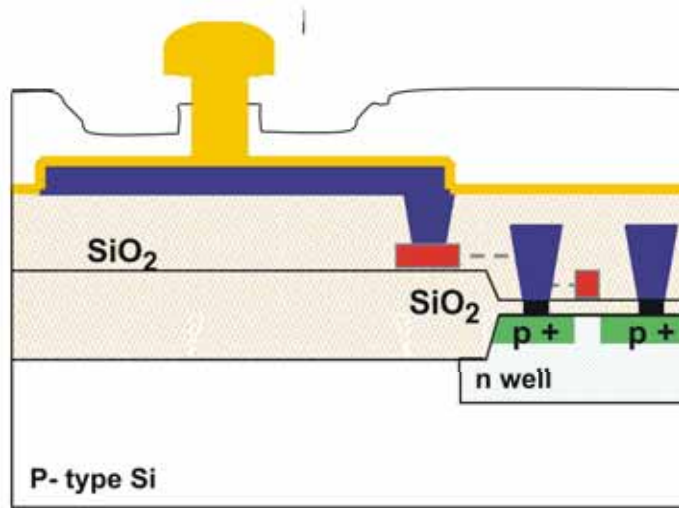
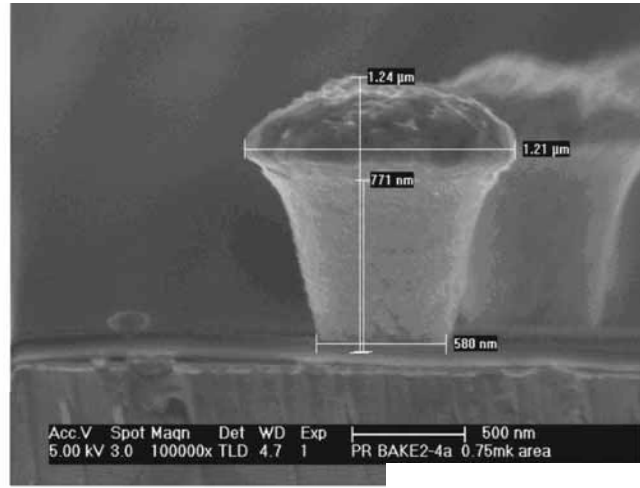
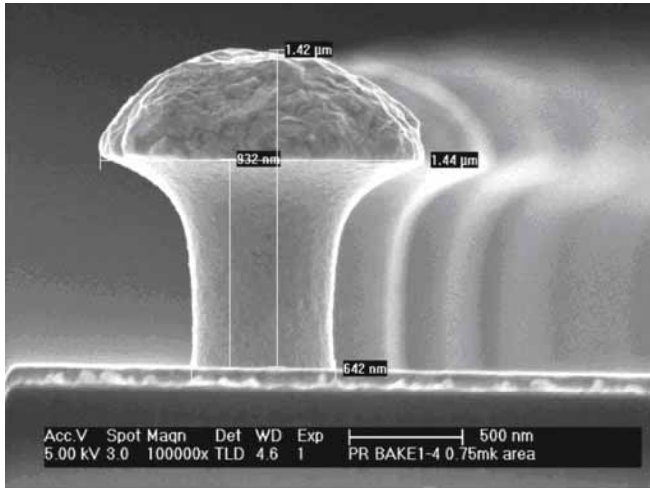


A.

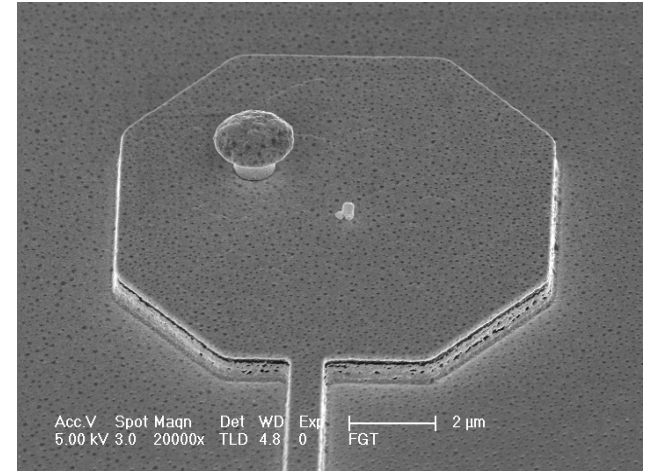


B.

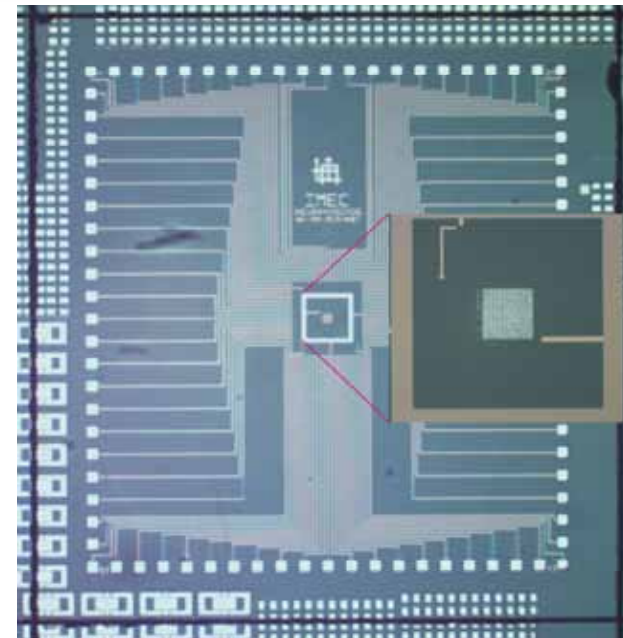
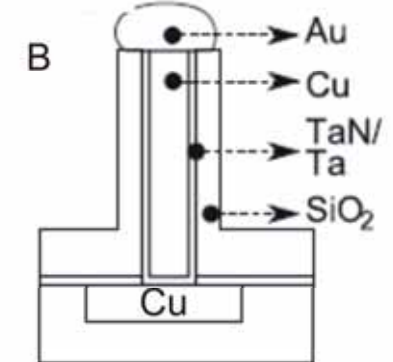
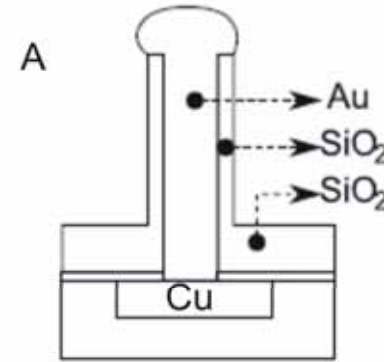
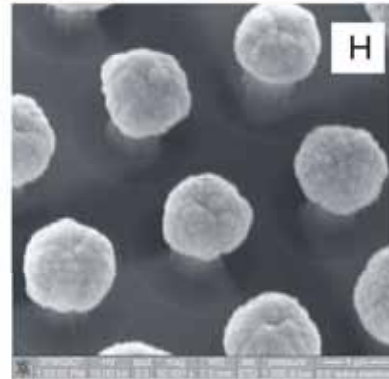
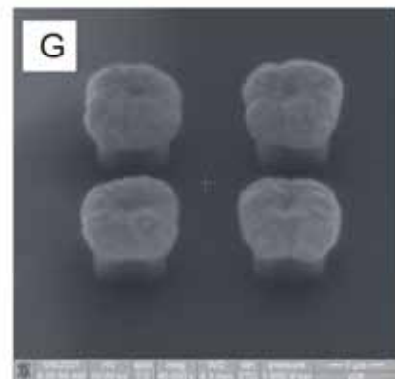
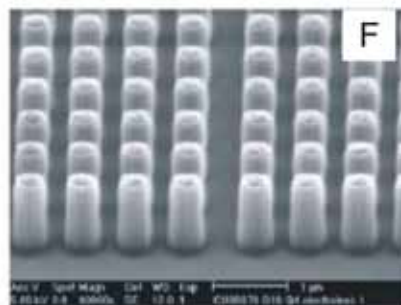
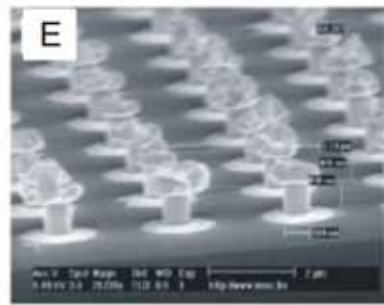
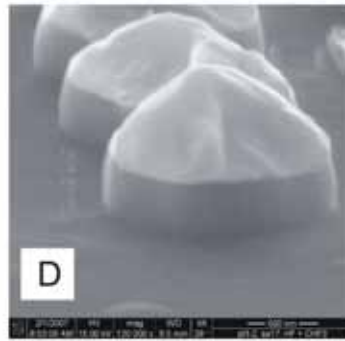
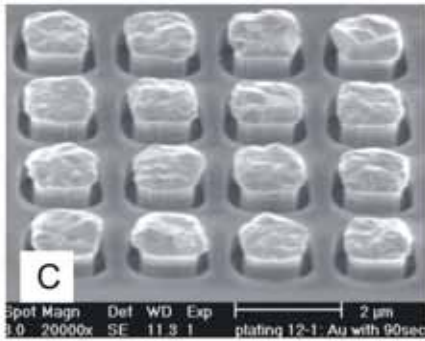
Integrated passive μ -nail structures on chip



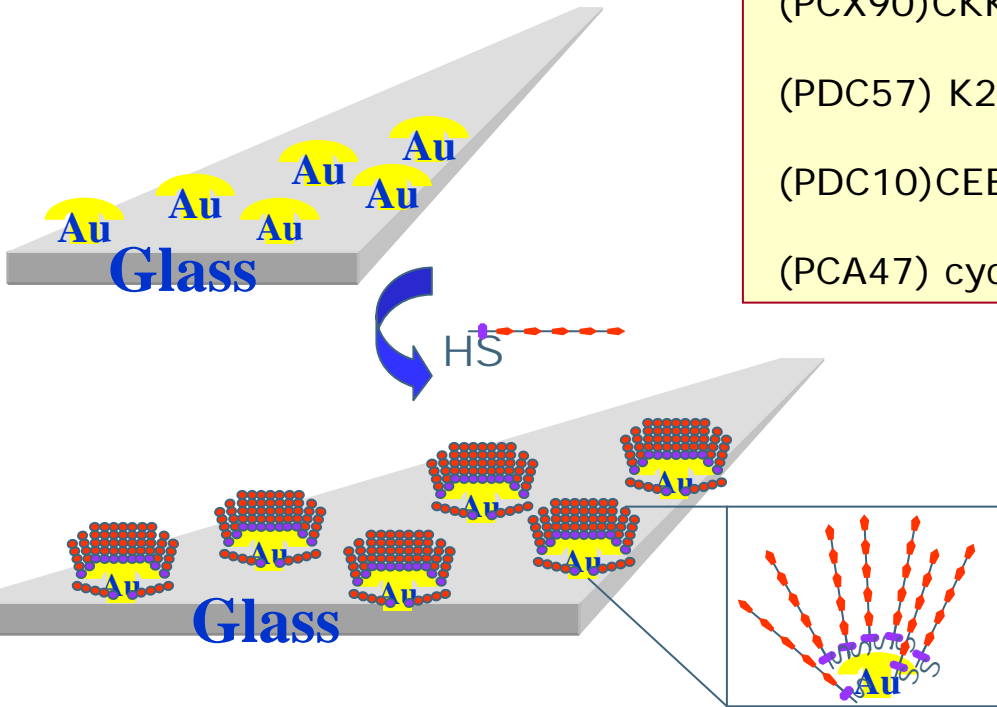
AI PAD WITH NAIL



CMOS compatible sub- μ -nail structures and active CMOS array electronics

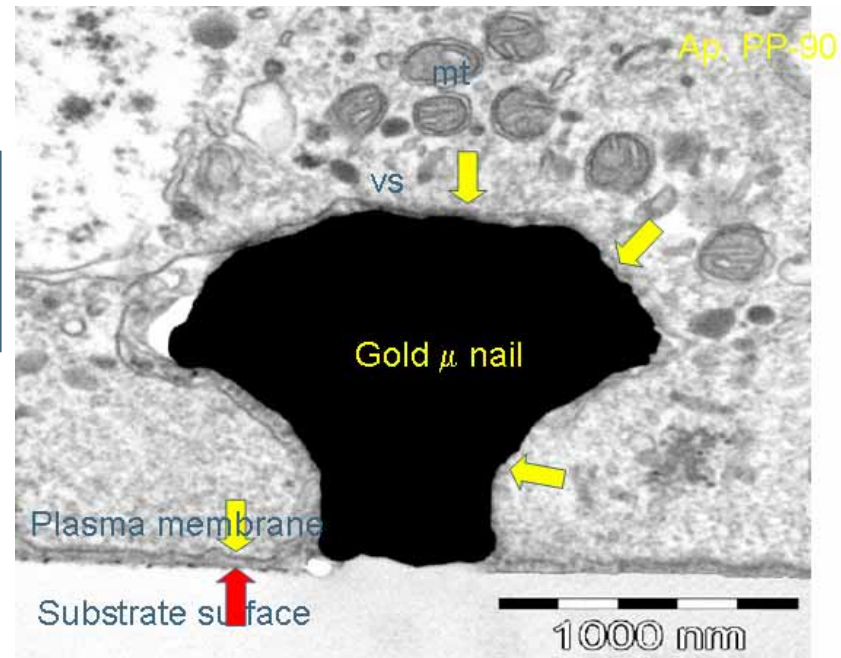


Bioactive surfaces

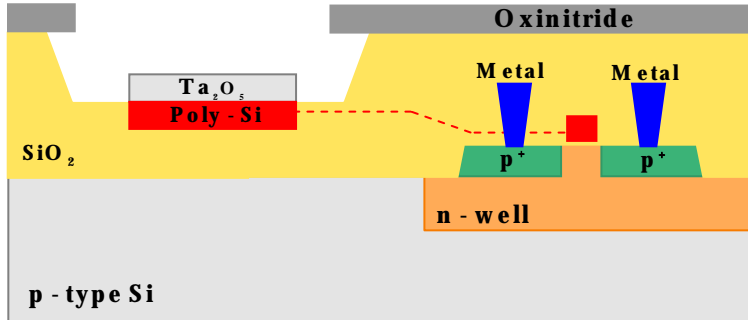


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 (PDC57) K20 CKKKKKKKKKKKKKKKKKKKKKKKKKKK
 (PDC10)CEEEEEEEEEEE
 (PCA47) cyclicCRIARGDFPDDRC-T3-DTT

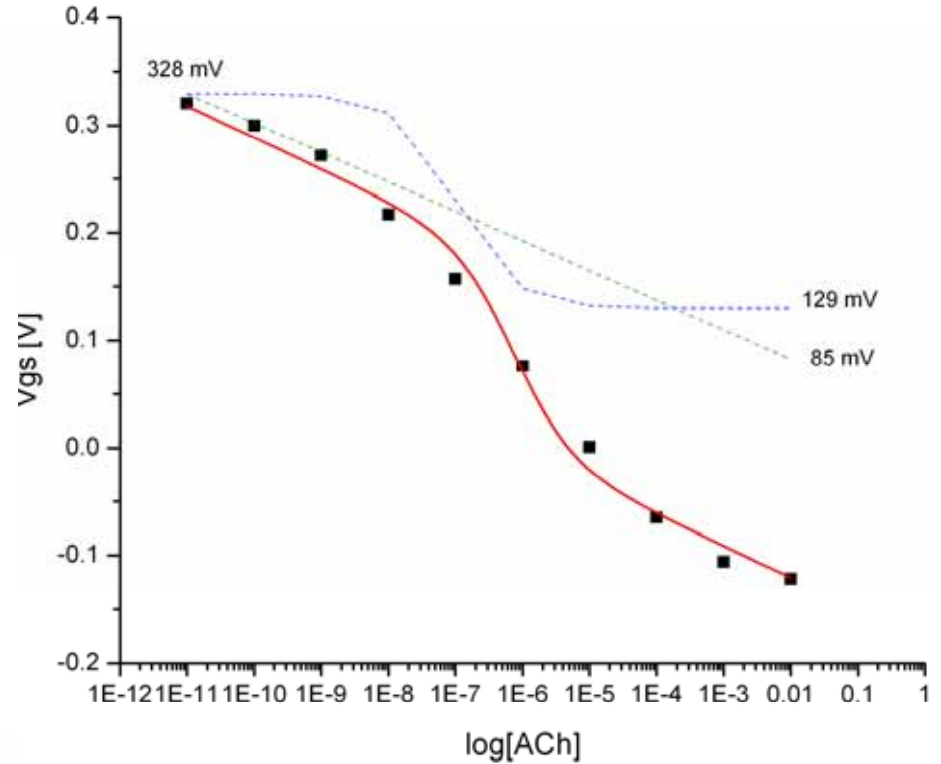
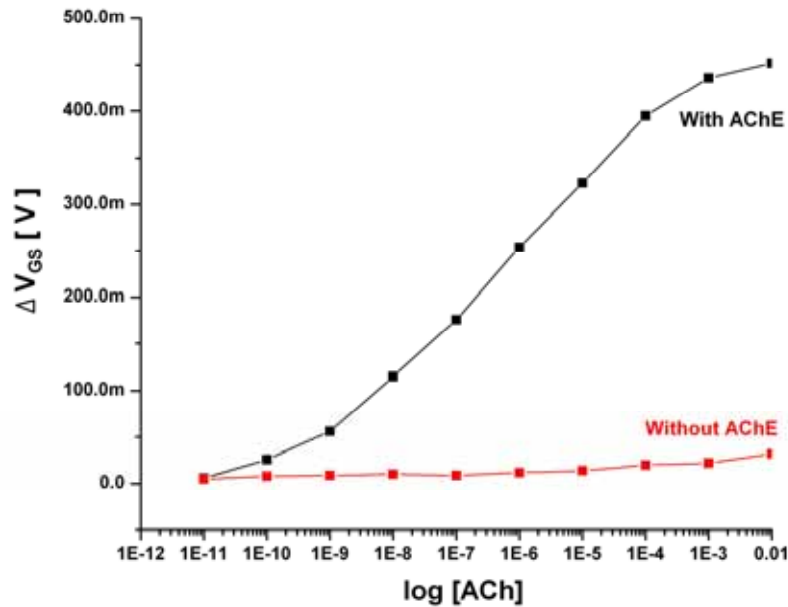
Applied to beads as model system
 and Au-nail decorated surfaces



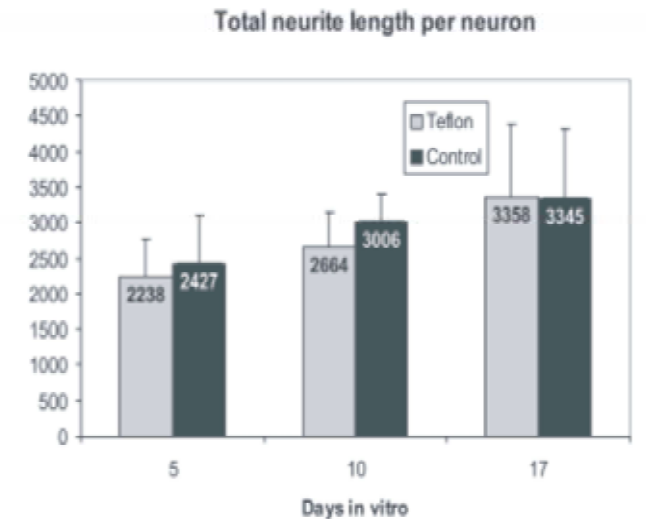
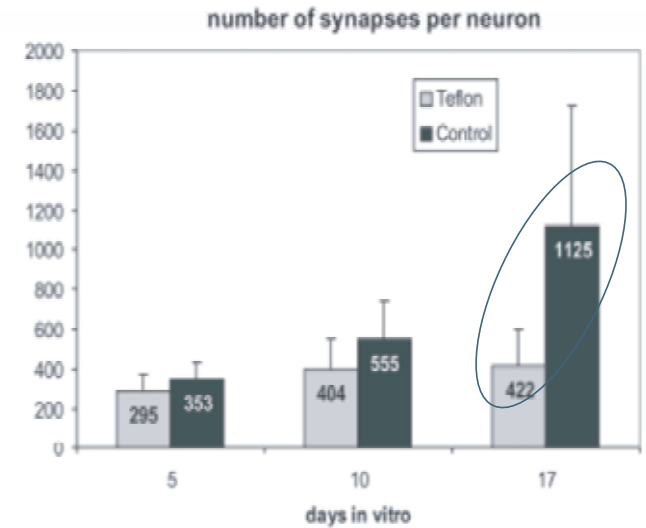
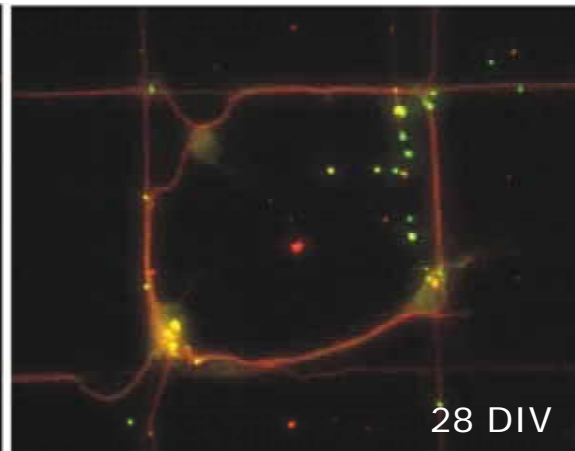
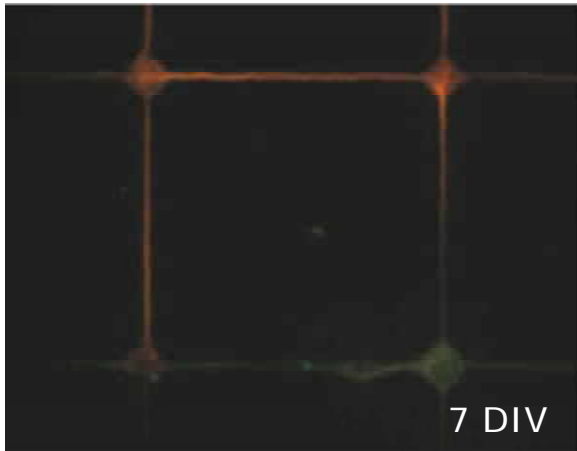
Highly sensitive ACh sensor based on AChE-immobilization on a FG ISFET



Device Sensitivity for different ACh Concentrations



On-chip guidance of neuronal network growth



Phagocytosis effects on biofunctionalized on-chip μ -nail structures

