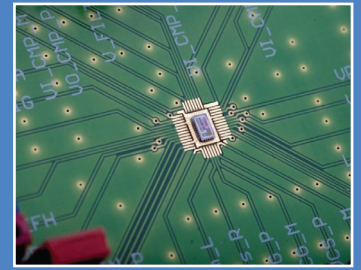




# ISyPeM

INTELLIGENT INTEGRATED SYSTEMS FOR PERSONALIZED MEDICINE



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## What it's about...

*Improving medical practice by enabling personalized medicine via therapeutic drug monitoring, while reducing health care costs.*

## Context and project goals

The purpose of the research was to advance the state-of-the-art in personalized medicine by creating new enabling technologies for drug monitoring and delivery rooted in the combination of sensing, in situ data processing, and drug release control mechanisms. The project explored new sensor technologies, hardware and software data processing means, and drug release mechanisms based on silicon membranes. This combination of new technologies can significantly better medical care and reduce the related costs.

## How the project differentiates from similar competition in the field

The project improves the state of the art by providing: (i) new point of care sensing systems (based on transmission SPR) and more robust probe molecules for specific drugs (based on DNA aptamers), (ii) new drug delivery mechanisms via electronically-controlled silicon membranes and (iii) an innovative approach to dose computing based on a formal design methodology for provably correct and safe electronic drug delivery.

## Quick summary of the project status and key results

Since its beginning, the ISyPeM project has generated more than 30 publications in peer-reviewed international high impact journals and conferences (and more are in preparation), including results issue of the collaboration of different groups of the consortium. Besides the scientific impact of the work, ISyPeM has focused on software and technological development. HEIG-VD work defined new dose-computing approaches and developed an exhaustive therapeutic drug monitoring user interface. The facilities in CMi and CSEM developed new integrated sensors and nanoporous membranes for drug release.

## Patent

Method for CMOS-Compatible Chip-to-Chip 3D Integration, Yuksel Temiz, Michael Zervas, Carlott Guiducci, Yusuf Leblebici.



## Success stories

Carlotta Guiducci was invited speaker to two important conferences in 2013: (EMBC 2013) IEEE Engineering In Biology and Medicine Society Conference and (IEDM 2013) IEEE International Electron Devices Meeting.

The highly ergonomic user interface for medical doctors to enable formalized therapeutic drug monitoring is now on line: [www.ezeCHiel.ch](http://www.ezeCHiel.ch). This tool is the result of the collaboration among three partners of ISyPeM (CHUV, HEIG-VD, EPFL-LSI).

ISyPeM won the best video award at the Nano-Tera annual meeting 2013.

Five demonstrators were presented to the 2013 Nano-Tera annual meeting who saw as well the participation of STMicroelectronics at the project stand.

### Presence in the media:

Carlotta Guiducci's interview at RTS: <http://www.rts.ch/la-1ere/programmes/cqfd/4719239-rencontre-avec-carlotta-guiducci-22-03-2013.html>

### Main publications

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Viswanathan Balasubramanian, Pierre-Francois Ruedi, Yuksel Temiz, Anna Ferretti, Carlotta Guiducci, and Christian C. Enz, A 0.18 Biosensor Front-End Based on Noise, Distortion Cancellation and Chopper Stabilization Techniques, *IEEE TRANSACTIONS ON BIOMEDICAL CIRCUITS AND SYSTEMS*, VOL. 7, NO. 5, 2013

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