CiQUS
Center for Research on Biological Chemistry and Molecular Materials

erc | USC UNIVERSIDADE DE SANTIAGO DE COMPOSTELA | CAMPUS VIDA CAMPUS DE EXCELENCIA INTERNACIONAL

Project Idea: HIGH-THROUGHPUT SCREENING CALORIMETRY

STARTING POINT: HIGH-THROUGHPUT CALORIMETRY

Thermal microsensor with improved temporal, thermal and spatial resolution, going beyond the current capabilities on Isothermal Titration Calorimetry (ITC).

KEY CHARACTERISTICS

Spatial resolution & **miniaturization**: micron-square size; active sensing easily deposited by sputtering.

Temporal resolution: up to milliseconds.

Accurate & easy quantification of binding rates & enthalpy changes...

Easy adoption: compatible with standard configuration of MicroCal.

IPR: EP3184981 (A1), US2017268936 (A1), CN107076622 (A), KR20170045252 (A) , Japan.

THE GOAL: HT CALORIMETRY for PHARMA

Decrease attrition rates, reducing the staggering costs of drug development.

- ✓ Accurate knowledge on **drug-target kinetics**,
- ✓ Quantitative information of a ligand binding to **several targets obtained at once**.

CURRENT PARTNERS AND CONTACTS

- Software company for the ITC data analysis (ES).
- Experts on High Throughput Screening and pharmacology (ES).
- Clean-room microfabrication facilities (PT).

We are looking for partners…

- ✓ Developing instrumentation for biophysical characterization.
- ✓ With expertise in microfluidic technologies.
- ✓ End users for biophysical/biochemical characterization.

erc **Starting point: prototype from ERC-PoC "ANTS"**, *New technology of microthermal sensing for application in microcalorimetry.*

Principle of operation: Nernst Effect. We use a **single-material device**: line of permalloy **20 nm thick, 4 x 28 µm**.

Device. We demonstrated its sensitivity for applications in microcalorimetry. The **fast response** makes it adequate for advanced microcalorimetry applications (~miliseconds).

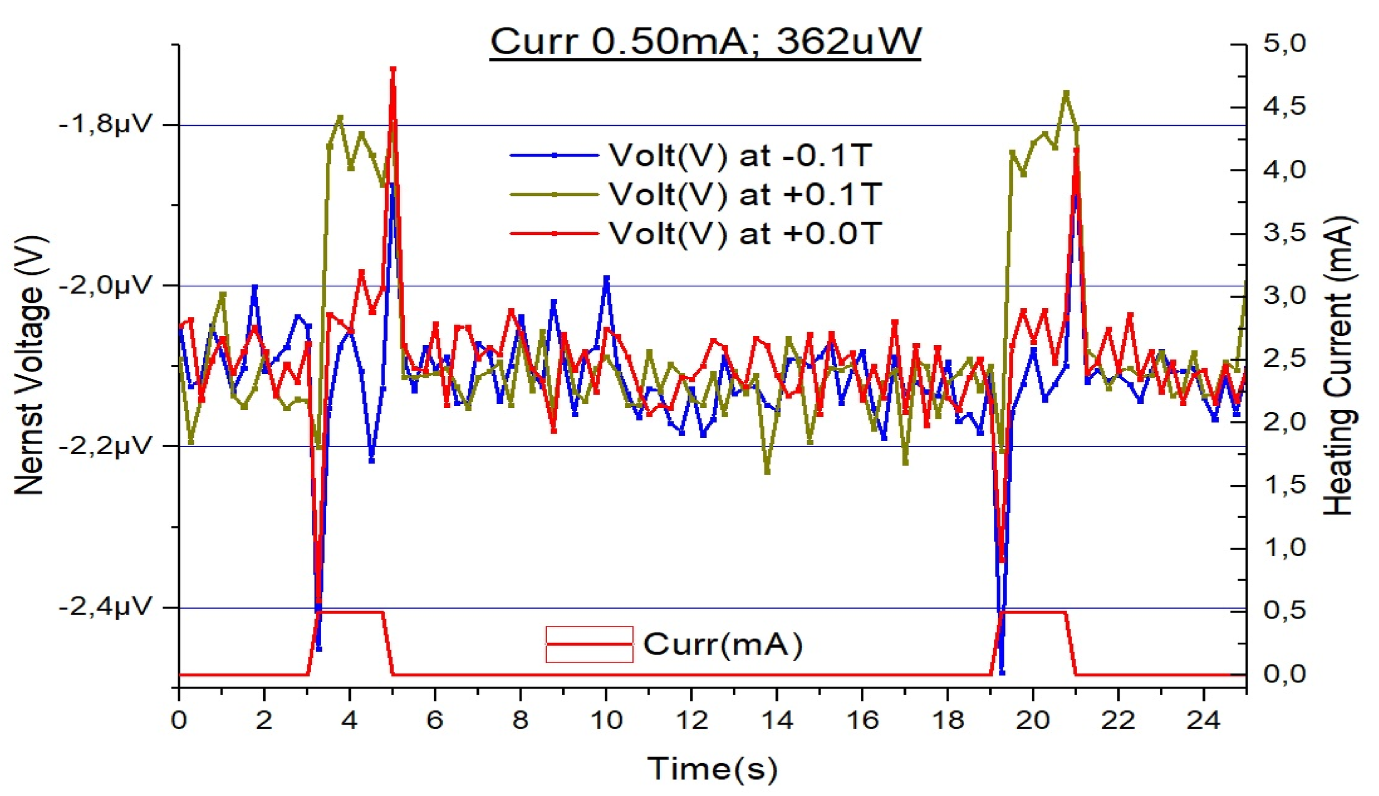
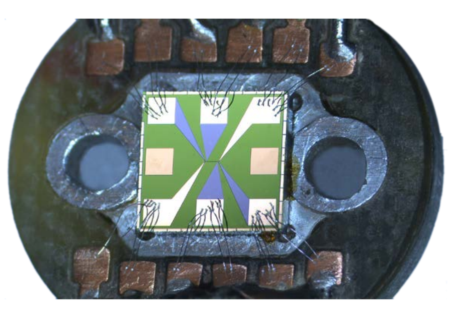


Figure 1: Fast response to an stimulus of 362 microWatts



Wire Bounded Chip

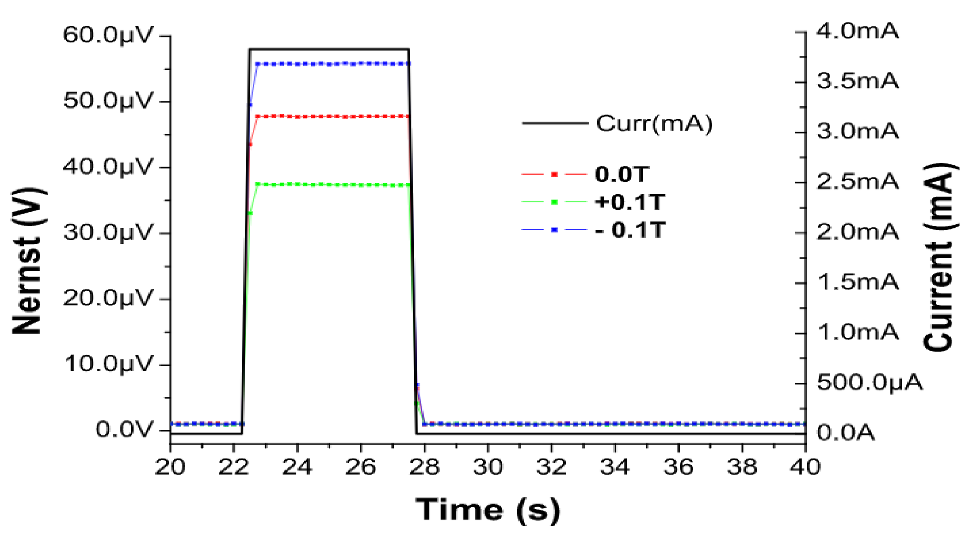
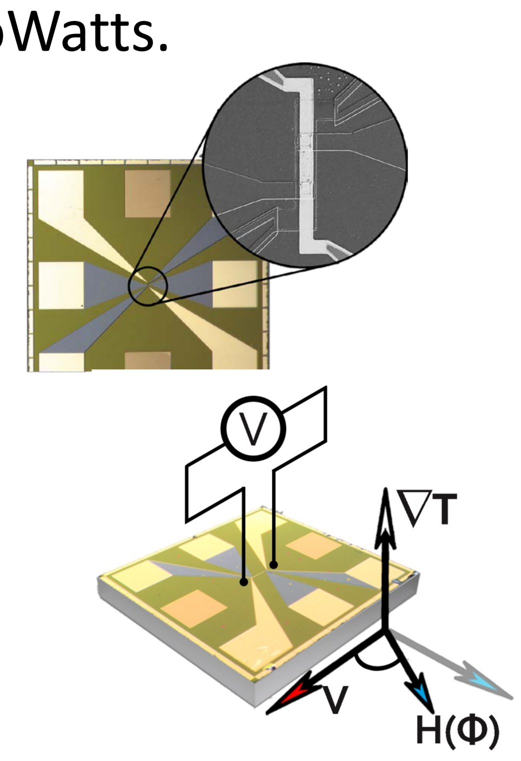
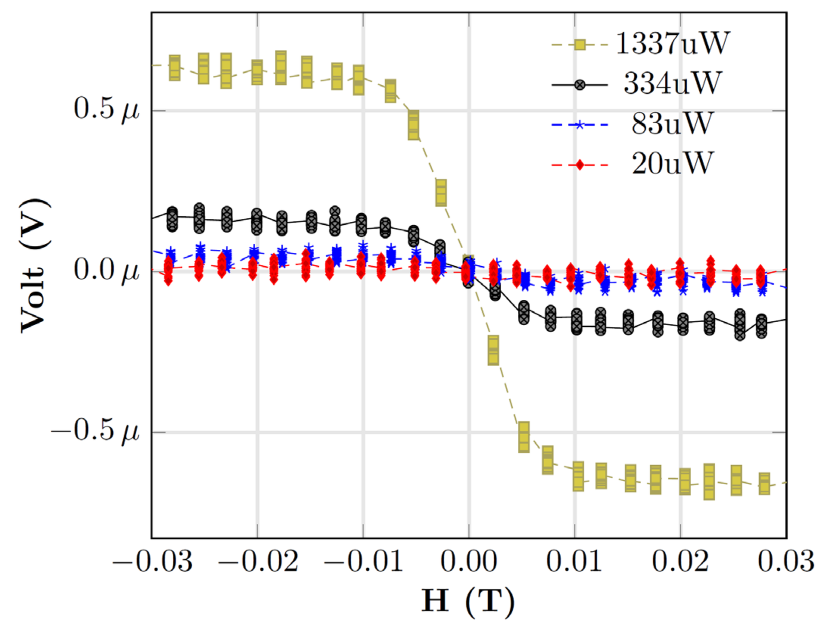


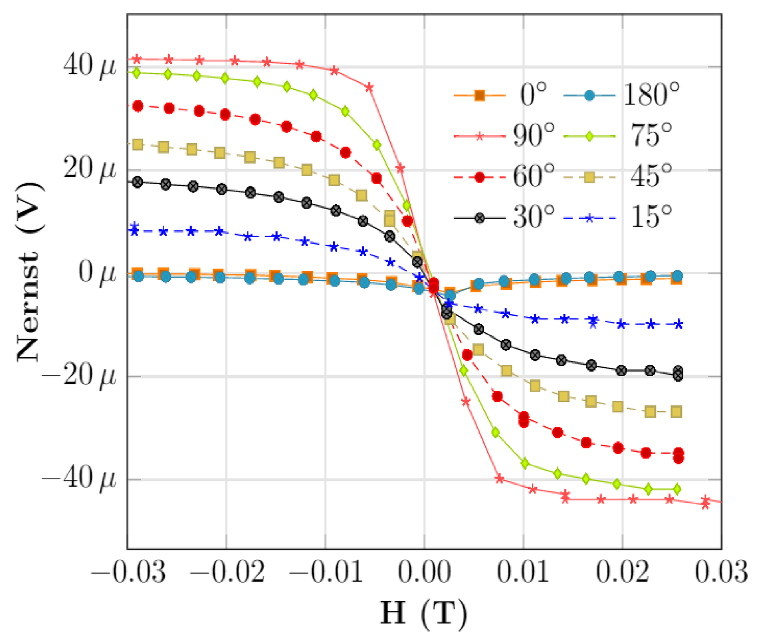
Figure 2: Nernst voltage vs. time, under a pulse of 20 mW power dissipated using the top heater.

Nernst voltage vs power. Response under constant power values while changing the field. The minimum detectable power dissipation using the multi line device is in the order of tens of microWatts.

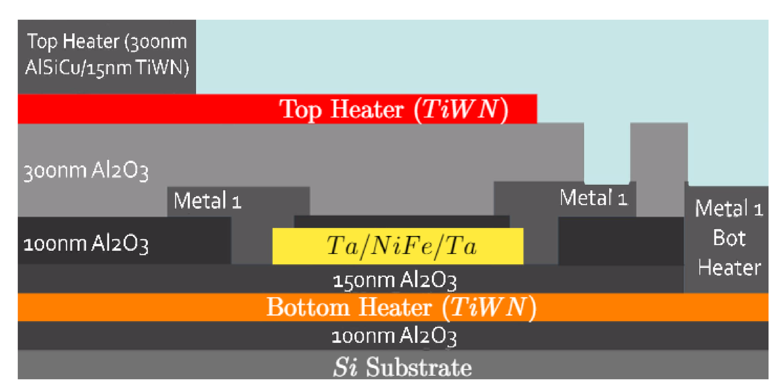




Nernst voltage vs field orientation. The power dissipated remains constant while we change the field values from -30mT to 30mT and the field orientation. $E_{ANE} = Q_s \mu_0 (M \times \nabla T)$



Internal Device structure:
layers of materials and dimensions.



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