Master's Thesis

In collaboration with the Professorship of Micro Sensors and Actuators, the Fraunhofer Research Institution for Microsystems and Solid-State Technologies EMFT offers a master's thesis position in the field of:

Design of an integrated Micro-Oven on FD-SOI Silicon

Fraunhofer EMFT works on the research and development in the field of microelectronics and microsystems technology. It takes an interdisciplinary approach to enable novel solutions for everyday use, combining traditional silicon semiconductor technologies with MEMS, microfluidics and flexible electronics.

<u>What is this about?</u>

In our IC design group, we aim for precise performance of electronic circuits under various temperature conditions. To stabilize the temperature locally (within a area of ~ 250 x 250 μm^2), we pursue the integration of a "micro-oven" on silicon. Such innovative solution requires not only a heater and a temperature sensor, but particularly a realistic thermal model of the system.

For this modelling part we seek your support and offer a challenging task for Master Thesis: As a member of our design team, you will compose thermal models from the material properties of a 22nm SOI waver process. While you run circuit & thermal simulations, you will eventually develop your optimized oven structure. This should allow an effective temperature regulation at ~100°C with respect to material/layer placement and electro-thermal coupling.
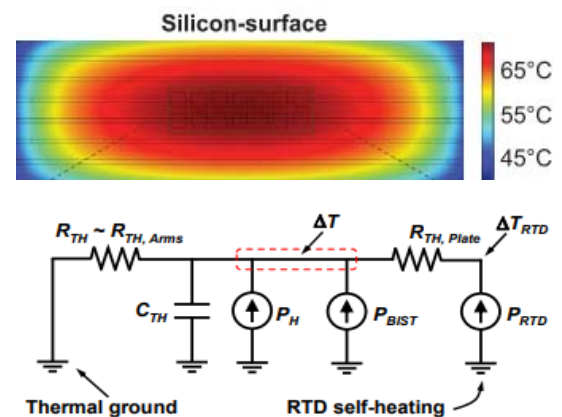
Your tasks
- Study existing realizations (publications) of "micro-ovens" and related challenges.
- Extract a realistic thermal model based on a sample IC layout.
- Perform thermal simulations for different versions of an oven structure.
- Investigate and utilize the support of "Cadence Celsius Thermal Solver" software.
- Eventually develop a sensor/actuator arrangement for maximum temperature stability.

Useful to have but not a prerequisite
- A solid know-how in thermal phenomena and the modeling of them.
- Experience with relevant tools (e.g. COMSOL) for thermal simulations.
- A basic understanding of semiconductor technology (from graduate level courses).
- Preferably some initial knowledge of integrated circuits and design tools (Cadence).
- Good analytical capabilities, with a pro-active and structured working style.
- Good German or English language skills

For questions regarding the position, please do not hesitate to contact:
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