

The Electronic Instrumentation Laboratory is proud to present its ninth EI Colloquium

Arvin Emadi:

Linear-Variable Optical Filter Microspectrometers

On-chip optical microspectrometers have huge potential for implementation in applications that cannot be served with conventional bulky and expensive spectroscopic instruments. For instance, optical analysis of the blood of a patient for hemoglobin, glucose, toxin etc. could be considered, which would allow a rapid diagnosis at the point-of-care or even at home.

A Linear-Variable Optical Filter (LVOF) is in principle a Fabry-Perot type of filter in which the thickness of the resonance cavity changes linearly along its length, resulting in principle in an infinite number of different Fabry-Perot filters. Hence, the number of separate spectral channels depends solely on the number of the elements in the photodetector array. Integration of a LVOF with a detector array can result in a robust, high-resolution on-chip microspectrometer.

In this talk optical principle of LVOF-microspectrometer, fabrication of the LVOF filter based on a reflow process, some measurement results and signal processing required to obtain the spectrum from the recorded data on the detector array are discussed.

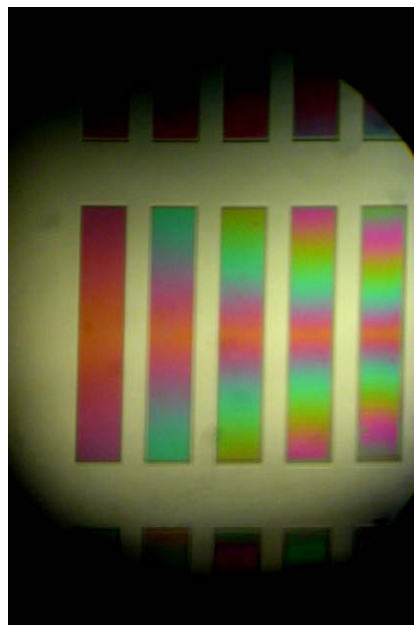


Figure 1: Colour change along the resist layer proves the thickness slope. The slope increase from left to right.

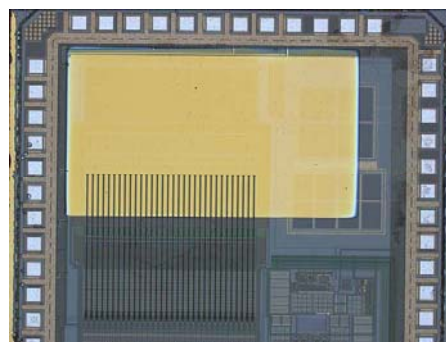


Figure 3: The die photo with the LVOF on top of the 128CTIA-APS linear array.

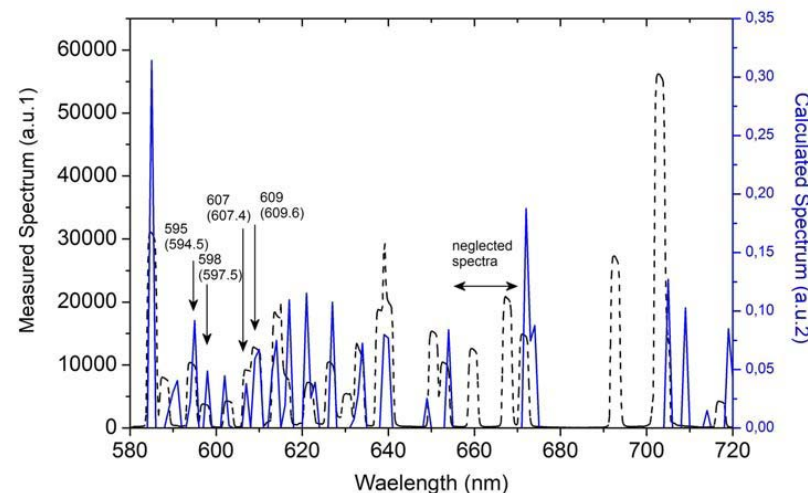


Figure 2: Comparison between calculated spectra and spectrum of Neon lamp measured by the commercial spectrometer.

Fabio Sebastiano:

Time References for Wireless Sensor Networks

Wireless Sensors Networks (WSN) need radios that are small, cheap and energy efficient. To save power, the receiver predicts the timeslot that the transmitter will use and turns itself off when no incoming signal is expected. The duty-cycle of the receiver can be lower if a more accurate time reference is available. However, high-accuracy crystal-controlled oscillators should be avoided to reduce the cost and size of the nodes. Thus, accurate and fully integrated frequency references are needed. In addition, the available power is limited to tens of μW , since the time reference is turned on continuously, and the supply voltage must be kept low to be compliant with typical WSN energy sources.

In this talk, we will show that fully integrated oscillators referenced to the charge mobility in a MOS transistor can be employed in WSNs. Prototypes in 65nm and 0.16 μm CMOS shows inaccuracies below 1% over a wide temperature range ($-55^\circ\text{C} \sim 125^\circ\text{C}$) while drawing less than 20 μA from a 1.2V supply.



Location:
Snijderzaal

Date & Time:
Monday May 9th, 16:00 - 17:00

Afterwards:
Drinks & Pizza!