

**Bachelor thesis for the programmes in  
Elektrotechnik und Informationstechnik  
Nanoengineering  
International Studies in Engineering**

**Topic:**

Automated electrical and optical measurements of integrated testcircuits and devices in a  $0,35\mu\text{m}$  CMOS-Process.

**Description:**

Charge Coupled Devices (CCDs) or CMOS-image sensor arrays are nowadays widely used in high definition digital cameras, camcorders and mobile phones. The advantage of CMOS-based image sensors over the CCD-based ones is the ability of integrating the detection and output circuits on the same chip with the photoactive region. The thickness of these silicon chips varies between  $400\mu\text{m} \leq d_{\text{wafer}} \leq 800\mu\text{m}$  according to the wafer used. As a result of this large, in respect to the overall chip area, thickness remains the chip rigid and inflexible. Hence, these chips are employed nowadays only for traditional planar image acquisition. However, ultra thin silicon chips with a thickness of  $d_{\text{wafer}} \leq 50\mu\text{m}$  can be produced, while being totally flexible. The use of these thin and flexible image sensor chips open up new vistas in the image sensor industry. As an example, flexible image sensors can be adapted to take any spherical or curved form. Moreover ultra thin image sensors could be – without any difficulty – wrapped around a  $10\text{mm}$ -diameter rod and be able to take a  $360^\circ$ -image.

In our department (Fachgebiet EBS), under cooperation with our partner-Institute Fraunhofer IMS and other research Institutes, research is at this moment conducted on the effects of mechanical stress on diverse electronic and optoelectronic devices (MOSFETs, Photodiodes, Capacitors) and analog circuits (differential amplifiers). In this phase of the research project the characteristics of the above mentioned devices and circuits on a bulk rigid chip ( $d_{\text{wafer}} \approx 700\mu\text{m}$ ) as well as on a thinned flexible chip ( $d_{\text{wafer}} \approx 20\mu\text{m}$ ) should be examined. For the determination of the needed parameters an already existing measurement setup in Fraunhofer Institute IMS will be available for use.

Within the scope of this Bachelor thesis electrical and optical measurements as well as characterization of the above mentioned devices and circuits must be performed. In order to achieve high reproducibility of our measurements, the measurement setups are being automated using LabVIEW® Software. In the scope of this thesis the necessity of an update of the existing LabVIEW® application must be examined.

**Background:**

- LabVIEW® Software (desirable but not required)
- Basic knowledge of Analog Circuit Theory (desirable but not required)
- Basic knowledge of optoelectronic and semiconductor devices (desirable but not required)

**Ansprechpartner:**

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