

Press Release 02/2017

I see the light Detecting the Direction of Incident Light

The CiS Research Institute has developed a tiny microchip for the determination of the direction of incident light. The small design and the easy integration as well as the cost-saving MEMS manufacturing technology suitable for mass production characterize the new component. The monolithic sensor is based on four integrated photodiodes in a 3D-structured silicon substrate.

Sensors for detecting the angle of incidence of light are known e.g. from tracking systems of photovoltaic plants. They are used to increase energy efficiency. Typically, they consist of several, discrete electronics and optical components and their assembly is complex. Caused by manufacturing, these hybrid constructions are relatively large and their performance parameters have a high spreading width.

The new RISEQ sensor technology from the CiS Research Institute enables the development and production of monolithically integrated, direction-sensitive sensors. The light direction can be determined to a few degrees. The technical concept is based on the integration of four photodiodes in the walls of a cavity in the silicon (Fig. 1, 2). Depending on the design, the size of the entire sensor module can be less than 1 mm³. The monolithic design of the sensor proves to be insensitive to shocks. The RISEQ sensor technology enables low design and manufacturing costs and minimal component scattering as well as high reproducibility and constancy of the electrical parameters (Fig. 3).

With these characteristics, RISEQ sensors are attractive for all applications that require a precise directional determination of an incident light beam. Examples include the control of modern lighting technology, the beam guidance in laser technology, the control of smart displays, applications in building automation, climate control and automotive safety.

The research and development work in the RISEQ project was funded by the German Federal Ministry of Economics and Energy (Funding code: MF130154).

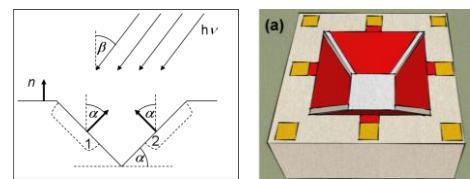


Fig 1: Functional scheme

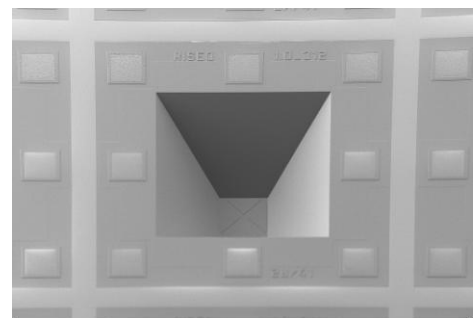


Fig. 2: SEM Picture of the RISEQ sensor

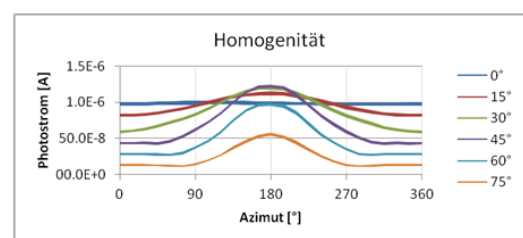


Fig. 3: The homogeneity of the four superimposed phase-shifted photodiode signals shows the high quality of the microsystem technologies used



Forschungsinstitut
für **Mikrosensorik** GmbH

Presentation of technology and prototypes at:

Hanover Fair, 24-28 April 2017, Hanover, hall 4, booth F34

SMT Hybrid Packaging, 16-18 May 2017, Nuremberg, hall 4A, booth 318B

SENSOR+TEST, 30 May - 1 June 2017, Nuremberg, hall 1, booth 1-150

About CiS Forschungsinstitut für Mikrosensorik GmbH

CiS Research Institute for Micro Sensors GmbH is a leading R & D provider in the fields of optical, micromechanical and piezoresistive sensors as well as silicon detectors. It employs more than 100 employees and supports companies in the development of customized solutions in the fields of sensor and microsystem technology and manufactures these in small batches. Basis is the silicon technology with the specialties: 3D structuring, stacking technologies and double-sided wafer processing.

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