

Scientific Paper:

Procedia Engineering 120 (2015), 598 - 601

## **Ultrasonic welding of chemical optical sensors supporting O<sub>2</sub>, pH and CO<sub>2</sub> imaging in microfluidic systems**

S. Krabbe<sup>1</sup>, D. E. Achatz<sup>2</sup>, T. Nieradzik<sup>1</sup>, C. Gerhardy<sup>1</sup>, W. K. Schomburg<sup>1</sup>

<sup>1</sup>RWTH Aachen University, KEmikro, Aachen, Germany

<sup>2</sup>PreSens Precision Sensing GmbH, Regensburg, Germany

### **Abstract:**

Chemical optical sensors for the two-dimensional imaging of three different analytes (O<sub>2</sub>, pH, CO<sub>2</sub>) have been integrated in microfluidic systems at up to three positions simultaneously by ultrasonic welding. The systems are a 48 well titer plate and a diffusion channel. The channel and the holder for the sensor foils have been fabricated by ultrasonic hot embossing. The non-invasive fluorescence read-out was performed with the VisiSens TD imaging system. The selective sensing capability of the optodes in the microfluidic channel has been proven. Masters for ultrasonic hot embossing can be fabricated inexpensively in various formats. Typical cycle times for production are in the order of a few seconds which allows low-cost production even in low quantities.

Keywords: Ultrasonic welding, ultrasonic embossing, chemical optical sensor, multisensor, titerplate