J Biosens Bioelectron 2016, 7:3(Suppl)
http://dx.doi.org/10.4172/2155-6210.C1.031

SCIL nanoimprint solutions; high volume soft NIL for wafer scale sub-10nm resolution

R J Voorkamp, M A Verschuuren and **R Van Brakel**
Royal Philips, Netherlands

Nanoimprint Lithography (NIL) is a promising technology for the cost effective fabrication of sub-micron- and nano-patterns on a variety of substrates. In NIL, distinction is made between hard and soft stamps. Real world conditions such as substrate bow and particle contaminants complicate the use of hard stamps, reducing stamp lifetime and yield. Soft stamps have the ablility to conform to the substrate and are less sensitive to particles but are too soft to support sub-micron features. Substrate Conformal Imprint Lithography (SCIL) developed by Philips solves the limitations of softstamp based NIL techniques and allows low pressure wafer scale (up to 200mm) conformal contact and sub-10nm resolution. This is done by using a tri-layer composite stamp with a modified silicone rubber which is stiff enough to prevent collapse of nano-patterns, but still soft to allow conformal contact on wafer scales without high pressure. The combination of a composite stamp and the SCIL method to apply the stamp on a substrate leads to the possibility to achieve sub-10nm structures and highly accurate overlay alignment. Additionally, a rubber stamp allows the use of inorganic sol-gel chemistry which makes it possible to directly pattern thermal and (UV) light stable silicon-oxide, which is an excellent hard mask for further processing, or can be used directly as a robust material in optical or bio-compatible (glass) in e.g. assay, cell-growth, or other biological applications. For successful implementation of a new patterning technology such as SCIL one need to take a solution approach, meaning that the equipment, material and process interactions need to be carefully aligned and optimized. Also, to optimize the cost of ownership the whole process flow needs to be considered, not only the lithography step. In our paper, we will present the approach chosen by SCIL Nanoimprint Solutions to bring high volume manufacturing solutions to the market and show its relevance for biosensor applications.

rob.voorkamp@philips.com

Terbium (III) as a luminescent probe for the detection of tuberculosis biomarkers

Tran-Thi-Thu-Hoa[1], **W Bamogo**[1], **L Mugherli**[1], **A Banyasz**[2], **A Novelli-Rousseau**[3] and **F Mallard**[3]
[1]Universite Paris-Saclay, France
[2]Laboratoire Francis Perrin, France
[3]BioMerieux, France

Tuberculosis still infects 8.8 million and kills 1.3 million persons per year. Early diagnosis of the infection would reduce the disease's effects. Many teams over the world have worked to improve in selectivity and time consumption the standard diagnostic methods based on sputum analysis and bacteria culture. Cepheid has commercialized an Xpert MTB/Rif test with the result in 2 hours. Despite its reduced price for developing and high TB burden countries, the system still suffers from a drawback: The calibration needs to be performed by a trained technician using specialized equipment. Therefore, the search for easy to use, low cost and selective tests remains a challenge. Non invasive detection of a specific metabolite marker of *Mycobacterium Tuberculosis (Mtb)* present in cultures and patients' breath is a promising method. A few metabolites of *Mtb* in culture supernatants were found to be specific for *Mtb*, including Nicotinic Acid (NA), methyl phenylacetate, p-methyl anisate, methyl nicotinate and 2-methoxy biphenyl. Interestingly, NA could also be detected in the breath of patients with active tuberculosis. Based on these findings, our objective has been to propose a new easy to use method for NA detection in biological samples and in particular in a breath condensate. The method is based on analysis of the luminescence increase of Tb^{3+} complexes in the presence of NA due to the energy transfer from the excited ligand. We will show the limit of detection and the strategy developed to circumvent interferences from other metabolites. The method's cost is evaluated and compared with the WHO endorsed Xpert MTB/RIF test.

thu-hoa.tran-thi@cea.fr