700
标题: New photoacoustic cell with diamond window for mid-infrared investigations on biological samples
作者: Kottmann, J (Kottmann, Jonas); Rey, JM (Rey, Julien M.); Sigrist, MW (Sigrist, Markus W.)
编者: Oraevsky AA; Wang LV
来源出版物: PHOTONS PLUS ULTRASOUND: IMAGING AND SENSING 2012??丛书: Proceedings of SPIE??卷: 8223??文献号: 82231A??DOI: 10.1117/12.905973??出版年: 2012??
在 Web of Science 中的被引频次: 1
被引频次合计: 1
引用的参考文献数: 19
摘要: We present a new photoacoustic (PA) cell, which is sealed on the sample side with a 163 mu m thick chemical vapor deposition (CVD) diamond window. The investigation of samples containing volatile compounds with an open-ended PA cell leads to varying conditions in the PA chamber (changing light absorption or relative humidity) and thus causes unstable signals. In contrast the diamond cover ensures stable conditions in the PA chamber and thereby enables sensitive measurements. This is particularly important for the investigation of biological samples with a high water content. Due to the high thermal conductivity of CVD diamond (1800 W/mK) strong PA signals are generated and the broad optical transmission range (250 nm to THz) renders the cell useful for various applications. The performance of the cell is demonstrated by tracking glucose in aqueous keratinocyte solutions with an external-cavity quantum cascade laser (1010-1095 cm(-1)). These measurements yield a detection limit of 100 mg/dl (SNR=3). Although glucose measurements within the human physiological range (30-500 mg/dl) are feasible, further improvements are needed for non-invasive glucose monitoring of diabetes patients. First in vivo measurements at the human forearm show an additional PA signal induced by blood pulsation at a frequency around 1 Hz and a steadily increasing relative humidity in the PA chamber due to transepidermal water loss if the cell is neither closed with a diamond window nor ventilated with N-2.
入藏号: WOS:000305073300039
语种: English
文献类型: Proceedings Paper
会议名称: Conference on Photons Plus Ultrasound - Imaging and Sensing/Photonics West BiOS Symposium
会议日期: JAN 22-24, 2012
会议地点: San Francisco, CA
会议赞助商 : SPIE
作者关键词: Photoacoustic; diamond; QCL; glucose; epidermis; keratinocyte
KeyWords Plus: WATER SOLUTIONS; SPECTROSCOPY; SKIN
地址: [Kottmann, Jonas; Rey, Julien M.; Sigrist, Markus W.] ETH, Inst Quantum Elect, CH-8093 Zurich, Switzerland
通讯作者地址: Sigrist, MW (通讯作者),ETH, Inst Quantum Elect, Schafmattstr 16, CH-8093 Zurich, Switzerland
电子邮件地址: kjonas@phys.ethz.ch; sigristm@phys.ethz.ch
出版商: SPIE-INT SOC OPTICAL ENGINEERING
出版商地址: 1000 20TH ST, PO BOX 10, BELLINGHAM, WA 98227-0010 USA

Web of Science 分类: Optics
学科类别: Optics
IDS 号: BAP68
ISSN: 0277-786X
ISBN: 978-0-8194-8866-4
29 字符的来源出版物名称缩写: PROC SPIE
来源出版物页码计数: 8