

Cost-Effective Indoor-Air Quality (IAQ) Monitoring via Cavity Enhanced Photoacoustic Technology

Authors : Jifang Tao, Fei Gao, Hong Cai, Yuan Jin Zheng, Yuan Dong Gu

Abstract : Photoacoustic technology is used to measure effect absorption of a light by means of acoustic detection, which provides a high sensitive, low-cross response, cost-effective solution for gas molecular detection. In this paper, we proposed an integrated photoacoustic sensor for Indoor-air quality (IAQ) monitoring. The sensor consists of an acoustically resonant cavity, a high silicon acoustic transducer chip, and a low-cost light source. The light is modulated at the resonant frequency of the cavity to create an enhanced periodic heating and result in an amplified acoustic pressure wave. The pressure is readout by a novel acoustic transducer with low noise. Based on this photoacoustic sensor, typical indoor gases, including CO₂, CO, O₂, and H₂O have been successfully detected, and their concentration are also evaluated with very high accuracy. It has wide potential applications in IAQ monitoring for agriculture, food industry, and ventilation control systems used in public places, such as schools, hospitals and airports.

Keywords : indoor-air quality (IAQ) monitoring, photoacoustic gas sensor, cavity enhancement, integrated gas sensor

Conference Title : ICECEME 2016 : International Conference on Electrical, Computer, Electronics and Mechatronics Engineering

Conference Location : Singapore, Singapore

Conference Dates : January 07-08, 2016