

Miniature infrared gas sensors using photonic crystals

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The sensitivity of an infrared gas sensor depends on the interaction length, i.e., a reduction in cell size generally results in a reduced sensitivity, too. However, low group velocity regions in the band structure of photonic crystals should enable the realization of very compact gas sensors. Using photonic crystals based on macroporous silicon experimental results with CO₂ show an increase of the gas sensitivity in the photonic crystal compared to an empty cell of same dimensions. For practical applications the results are compared with gas measurements using conventional multireflection cells and hollow fiber setups.