

Nanoassembled Thin-Film Gas Sensor II. An Intrinsic Highly Sensitive Fibre Optic Sensor for Ammonia Detection

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A layer-by-layer approach was used for the deposition of coatings with a nanometre thickness onto a multimode optical fibre, from which the cladding had been removed, with the aim of realizing a fibre optic ammonia sensor. The film was self-assembled with alternate layers of tetrakis-(4-sulfophenyl) porphine (TSPP) and poly(diallyldimethylammonium chloride) (PDDA). The exposure of the assembled film to ammonia induced optical changes in the transmission spectrum of the coated optical fibre, reflecting the characteristic absorption bands (Soret and Q bands) of the assembled TSPP compound. The fibre optic sensor showed a linear sensitivity to ammonia in the concentration range of 0.1–20 ppm and the response and recovery times were less than 3 min with a limit of detection of 0.9 ppm at 706 nm.

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