Use of the Fibre Optic Sensor Incorporated with Fluorescent Dye and Absorbents for Temperature Detection

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Abstract

Temperature is an essential physical parameter in all fields of science and process control technology [1-2]. As fiber optical sensors showmany advantages over electrical counterpart such as high sensitivity, small size, safety in hazardours or explosive environments and potential for signal processing over large distances, many fiber-optic temperature sensors have been theoretically and experimentally investigated. Among them the fluorescence method is one of the most sensitive one as excitation and emission light can be separated resulting in low background noise [3]. In the present work Rhodamine B was used as a fluorescent dye which belongs to the xanthene dyes, whose optical properties depends on many factors, such as solvents (polarity and aprotic character), concentration, pH value, temperature and the supporting material in case it is immobilized. Silica gel (28-200 mesh) and the solgel of the mixture of 3-amino-propyl-trimethoxy-silane (APTMOS), 3-glycidoxypropyl-tri-methoxy-silane (GPTMOS) were used as support matrix of fluorescent dye. These materials were attached on the fiber end of the optical probe (COMTE GmbH Germany, model: MOPS4). Yield of fluorescence intensity is converted to volt unit. The linear detection range was observed between 0-100 oC and 0-65 oC for silica gel and for sol-gel respectively.

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