A Low Temperature Plasma-Assisted Cataluminescence Sensor for Ethylene Discrimination

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Combining plasma and cataluminescence, with MgO nanomaterials prepared by sol-gel method as the sensing element, we have developed a low temperature plasma-assisted cataluminescence sensor for ethylene detection. Without the heated element of the traditional cataluminescence method, rapid and sensitive discrimination of ethylene was achieved at room temperature. Through optimization of the experimental conditions, the cataluminescence sensor gave a linear range of 282 ng/mL-21.43μg/mL (226-17173 ppm, R=0.96609) with a detection limit of 282 ng/mL at 200 mL/min flowrate of carrier gas. Besides, the sensor showed good selectivity for ethylene detection, when ethylene coexists with methane, ethane, propane, and propylene, except the slight disturbance of acetylene. In addition, the feasibility of this sensor was investigated, and it had good reproducibility. This sensor is simple and thermally stable. With the abundant alkaline-earth nanomaterials acting as catalysts and the absence of heating elements has greatly simplified the equipment and improved its applicability.