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LPG sensing by p-polyaniline/n-PbS heterojunction junction capacitance structure

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Abstract

In the present work, p-polyaniline/n-PbS heterojunction is fabricated by electrochemical polymerization of polyaniline over the pre-deposited PbS thin film. Electrical properties such as static resistance, rectification ratio, ideality factor for different thicknesses of PbS and polyaniline are determined. Room temperature (300 K) liquefied petroleum gas (LPG) sensing ability of p-polyaniline/n-PbS heterojunction is investigated using junction capacitance. Scanning electron microscopy (SEM) study shows that PbS thin film consists of compact nanograins whereas polyaniline exhibited highly porous structure. Heterojunction showed decrease in forward biased current after exposure to LPG due to increased barrier height (ϕ_B) of the junction interface. The increased barrier height is confirmed by observing junction capacitance after exposure of LPG. Variation in junction capacitance is used to detect the sensing of LPG at room temperature (300 K).

Keywords: Heterojunction, Sensor, Liquefied Petroleum Gas, Junction capacitance

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