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STABLE LPG SENSOR BASED ON BN/PD COMPOSITE FILMS BY PLD TECHNIQUE

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ABSTRACT

SnO_2 and ZnO films have emerged as one of the potential material for various gas sensor applications and have been subjected to extensive research for the development of marketable prototypes. Sensors based on the above materials change their electrical conductivities in presence of oxidizing and reducing gases. Unfortunately, the prototypes available in the market, based on the above metal oxides have a significantly high operating temperature range of 473-573 K. This culminates in a drift in the electrical resistivity of the sensor material due to gradual surface oxidation when exposed to such higher temperatures during their use in ambient conditions leading to device failure.

ABSTRACT

Like diamond, c-BN is a metastable material at normal pressure and temperatures having unique properties which include high degree of hardness, strength, chemical stability wear resistance thermal stability in oxygen atmosphere, chemical inertness even superior to many other competitors. Considering the above advantageous combination of properties of BN, we ventured in the use of BN as a host matrix for BN/nanocrystallinePd based LPG sensor material.

In this work, pulsed laser deposition technique (PLD) was adopted to deposit BN onto soda lime glass substrates. Palladium in nanocrystalline form was incorporated in these films by rapid thermal annealing. The films thus obtained, were characterized by SEM and FTIR studies. Liquid Petroleum Gas (LPG) sensing properties were also investigated critically. Very stable and reproducible LPG sensing properties and comparatively at lower operating temperature of 460 K would make this material superior to prevalent oxide based sensor.

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