Highly Sensitive Nano-Ferrite for Detection of Carbon Monoxide in Air

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Development of miniaturized Nanosensor for detection of CO (Carbon Monoxide) gas at low temperature, with lower detection limit and long term stability. Several nonmaterials in particular Semiconductor Metal Oxides, were synthesized using precipitation and co-precipitation methods and screened for detection of toxic gases. Nanomaterials where chosen from the transition metal series as they exist in variable oxidation states and also Manganese, Iron etc, are known to have strong affinity towards carbonyl in literature. Gas sensing is all about oxidation and reduction reactions requiring variable oxidation states. Among these, manganese ferrite (n-MnFe2O4) nanoparticles showed promising results. Thorough characterization (XRD, TEM, HRTEM, SAED and EDX) of the compacted nanoferrite has been carried out. Different particle sizes of n-MnFe2O4 were syntheised and gas performance studied. It was found that average particle size of 10-20nm showed best results Electrical device has been fabricated on glass, sputtering gold of 100nm thickness for electrical contacts and nanomaterial dropcasted on it. Gas sensing has been carried out using in-house gas set up. Performance characterization of a cost-effective sensor unit yielded satisfactory results. CO detection limit as low as 0.1 ppm at 25oC (room temperature) has been achieved with the n-MnFe2O4 sensor. Novelty: Ultra low level CO sensing with n-MnFe2O4 sensor at 25oC. The cost of the device is under $10.Application: A simple hand held portable miniaturized device which can be operated by anyone. Using the device pollution levels at different parts of Bangalore city was measured and compared with available data from government agencies. Data was comparable

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