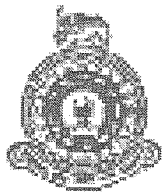

Developing films of Polyaniline and PMMA with varying conductivities to be used as gas sensors

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Abstract

Conductive polymers are polymers that conduct electricity. Such as polypyrrole (PPy), polyaniline (Pani), polythiophene (PTh) and their derivatives. Based on there conductivity when doped with different molecules these polymers can be used as gas sensors that are more reliable than metal oxide das sensors. And the sensor can be used over and over again. Poly methyl methacrylate (PMMA) is a clear polymer that is used to make flexi glass. The objective was to produce PMMA with conductive properties by incorporating polyaniline, that's also having sensitivity for LP gas.

Initially Experiments were conducted to find the optimal conditions for polymerization of Methyl methacrylate monomer by using Benzoly peroxide as the free radical initiator and using different temperatures. Then experiments were conducted to incorporate polyaniline to PMMA. Polymerization of aniline in methyl methacrylate by the same initiator was not a success but pre polymerized polyaniline can be incorporated to PMMA. Samples of polyaniline were synthesized by incorporating Ni^{2+}, Fe^{2+}, Co^{2+} and Cu^{2+} ions to be used as the gas sensing conductive material

For measurement of conductivity values different apparatus were designed based on the four probe conductivity measuring principle. Conductive behavior of polyaniline was tested by passing different gas combinations to test weather there is sensitivity for LP gas

From above experiments , It was found that the most suitable polymerizing agent for polymerizing methyl methacrylate is Benzoyl peroxide, where 10 ml of methyl methacrylate monomer requires 100 mg of Benzoyl peroxid The optimum temperature for polymerization is 60 ^{o}C. It was not possible to copolymerize aniline and methyl methacrylate, using benzoyl peroxide. However, it was possible to mix pre polymerized aniline with methyl methacrylate to obtain solid polymers of methyl methacrylate containing polyaniline. According to experimental results, it can be conclude that polyaniline posses a slight sensitivity to LP gas. In addition to the above, it was found that polyaniline shows significant changes in conductivity when exposed to moisture. When moist gasses were flown over polyaniline, the conductivity increased, regardless of the identity of the gas. When the gasses were dry, conductivity decreased significantly.