Abstract

Plants, when attacked by herbivores emit plant volatile compounds such as certain ester, terpenes and green leaf volatiles as a defensive mechanism to protect themselves from herbivores and parasites. Secreting these volatiles is not only toxic towards these insects but also aids enemies of the herbivores to recognize infested plants and to locate their prey. A polyaniline and aminobenzoic acid copolymer was synthesized by inverse emulsion polymerization using benzoyl peroxide as oxidant and hydrochloric acid as dopant which will be designed and fabricated to detect insect infestation. The synthesized copolymer was subjected to different volatile esters and terpenes such as methyl jasmonate, hexenyl acetate, hexenyl butyrate, ocimene, linalool, farnecene. The results show that the copolymer is highly selective and sensitive to volatile esters. The synthesis parameters like type of monomer, synthesis temperature, dopant and monomer ratio were optimized. Copolymer of aniline and m-aminobenzoic acid synthesized at 30 °C in acid medium using 1 M HCl as dopant and with the monomer ratio (aniline: m-aminobenzoic acid) of 1:1.5 showed better response towards ester vapors. The standardized copolymer was coated onto two different substrates: cross linked PVA film and silane modified glass. The copolymer coated on silane modified glass showed 78% response towards ester vapors at 60 ppm concentration. When an ester vapor was present, the copolymer resistivity increased resulting in decrease in conductivity. When the analyte was no longer present, the polymer will return to its original state, showing a decrease in resistance. This sensor is cost efficient, easy to fabricate and was highly stable in air. The sensing mechanism has been explained on the basis of FT-IR spectroscopy. And the copolymer film showed complete reversibility towards ester vapors.

Keywords: Plant volatile, Esters, Copolymer, Aniline, Aminobenzoic acid.