



**INVESTIGATION OF MODIFIED CONDUCTING POLYMER  
FILMS FOR HUMIDTY SENSING**

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## ABSTRACT

Polyaniline (PAni) and Polypyrrole (PPy) are conducting polymers (CPs) which are widely studied to be used in chemical sensors. The main focus of this study is to investigate pristine and modified PAni and PPy films deposited on glass substrates to be used in humidity sensors. CPs are good candidates to be used as active layers of chemical sensors because of their low cost of production, bio-compatibility and facile fabrication, *etc.* PAni and PPy thin films were chemically immobilized on glass surfaces. Stainless steel wires were connected to the film in order to fabricate conductometric humidity sensors. Electrochemical immobilization of another layer of polymer on chemically immobilized layer improved the electrical contacts and the stability of sensors. All of the sensors made by pristine and modified CPs, were sensitive to relative humidity. Conductance of all sensors was increased upon exposure to humidity. Pristine PPy sensor was more sensitive to humidity than pristine PAni sensor. Humidity sensing properties of PAni seemed to be affected by doping it with transition metal ions. Making composite CP films by electrochemical deposition of PAni on chemically immobilized PPy film produced a sensor having improved sensitivity. There are two linear response regions in both low humidity and high humidity ranges. PAni sensor is also sensitive to hydrogen gas at dry conditions and the hydrogen sensitivity is masked by humidity. PPy film undergoes significant polarization polarized at low humidity conditions, when a DC voltage is applied.