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Group: Nanotechnology Applications for Agro Food and Health
Project : Carbon dioxide nanowire sensors for office and greenhouse applications
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Fields of interest: Conducting polymers/ composites for gas sensing: polymer surfaces/interfaces, Nanowire synthesis techniques and nanoscale assembly, Micro- and nano-scale fabrication, Nanoscale devices: integrated sensor microsystems, nanowire integrated sensors, ultra low-power wireless sensors
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Introduction

Continuous monitoring of CO_2 levels in greenhouses is needed to optimise growth of plants. Wireless sensor networks are often used for this purpose and require inexpensive sensors operating at low power and thermal reliability. These requirements make conventional NDIR and electrochemical based CO_2 sensors unsuitable. Conducting polymer (e.g. unprotonated sulfonated polyaniline) based sensors are seen as potential alternatives for CO_2 sensing, where a change in conductivity of polymer is observed by doping (protonation) with acid (i.e. carbonic acid) at room temperature.

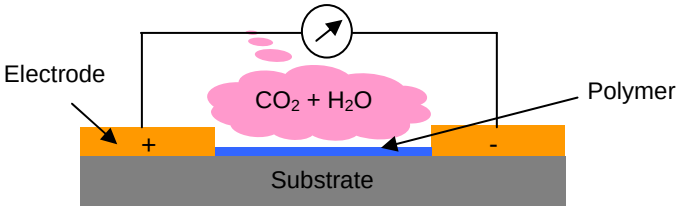

Fig. 1. Configuration of chemiresistor sensor with polymer thin film/ polymer nanowire

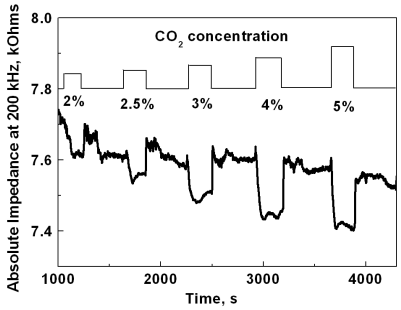

Fig. 2. Step mode response of unprotonated sodium salt sulfonated polyaniline film to various CO_2 concentrations

Goal

The aim of this project is to develop nanowire gas sensor modules based on conducting polymers/composites operating at room temperature. The gas sensor will be integrated onto a low power wireless electronics platform. Detection of the CO_2 concentration is measured by specific change in DC resistance or AC impedance of polymer nanowires.