Development of an array of chemiresistive sensors for early detection of diseases through breath analysis

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Early detection of diseases significantly increases the chance of survival and reduces the cost of the overall treatment. Traditional methods for the detection and diagnosis of diseases are often invasive, expensive, painful, and time-consuming. In addition to these, the equipment used for such methods are often bulky, expensive, and require expert level training for the proper operation. Breath analysis is a promising candidate to detect and monitor non-invasively various diseases such as lung cancer, breast cancer, diabetes, melanoma, asthma, etc at their earliest stages. An array of highly sensitive chemiresistive sensors offer many advantages over traditional analytical tools including being inexpensive, ease of use, rapid response time and results, low operating cost and operation without any training, excellent precision, greater portability, and flexibility in sensor array specificity for selective applications. In this work, an array of sensors based on highly sensitive metal oxides has been designed and developed to rapidly detect trace concentrations of various noxious gases which are biomarkers for various diseases. Flame spray pyrolysis technique has been used to synthesize and deposit highly porous and sensitive metal oxides on individual sensors.