Development of spinel-type $ZnFe_2O_4$ based chemiresistive sensors for application in the food sector: Their fabrication, optimization and testing

The need to detect gases in a simple and portable manner has led to the development of chemiresistive sensors. In recent years, development of semiconducting metal oxide (SMO) based sensors has been a hot research topic owing to their low cost, portability, easy fabrication, and controllable preparation which makes them desirable for a wide range of applications. Amongst other SMO based oxides, zinc ferrite ($ZnFe_2O_4$) has shown excellent gas sensing capabilities towards certain volatile organic compounds (VOCs) emitted by various food products. Although $ZnFe_2O_4$ shows good sensing properties towards VOCs, its sensitivity and selectivity among individual VOCs gas species remains a challenge. One way to overcome these challenges is by combining $ZnFe_2O_4$ with different SMOs to produce heterostructures possessing unique properties to improve sensing performance through synergistic effect. Furthermore, sensor fabrication and post analysis of data optimizes a sensor for a particular application. The main goal of this study is to optimize fabrication and develop $ZnFe_2O_4$ based gas sensors displaying improved sensing behavior for application in the food sector.

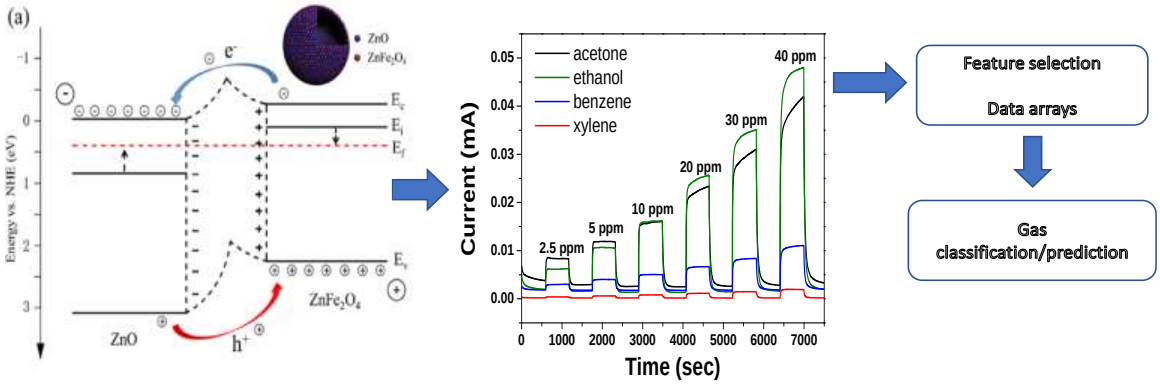

Fig 1: Systematic approach adopted in development of $ZnFe_2O_4$ sensor arrays.