The goal of this thesis study is to rapidly detect some food additives that serve as quality attributes and health concerns. In this thesis, three distinct food additives formalin (FAL), metanil yellow (MY), and vanillin (VNL) have been selected as targets analytes. Metal oxides, and molecularly Mimprinted polymer (MIP) based electrodes are presented to explain the selective determination of FAL, MY, and VNL. An electrochemical sensor system has been implemented as a novel and simple approach for food preservative formalin detection. In the proposed work, a low cost, rapid electrochemical detection system of FAL using a platinum working electrode has been fabricated. Next, a rare earth metal electrode CeO2@GP has been prepared for electrochemical detection of FAL in mushrooms. The prepared electrode provided a wide linear range of 25 µM-1 mM with a low detection limit of 1 µM. The electrode studied in this work exhibited a wide linearity range from 10 µM to 1000 µM with a LoD of 0.63 µM under optimized experimental conditions. Electrochemical detection of food colour MY in turmeric powder samples using NiCo2O4 nano crystallites cast over graphite paste has been demonstrated. A sensitive, specific, and accurate molecular imprinted polymer based electrode with an electrochemically induced approach for detecting MY, was developed and is next presented. The sensor also excelled in terms of lower detection limit 0.67 nM for MY with a wide linear range 1 nM to 1000 µM. MIP analysis efficiently detected the different quantities of MY in real turmeric powder and pigeon pea samples and the responses were validated with the results from HPLC analysis. The third study includes an electrochemical approach to detect and measure food flavour VNL in food using graphite paste electrodes decorated with molecularly imprinted polymer. The performance of the developed sensor was studied in real samples for VNL trace discrimination. Recently an approach toward the development of a low-cost, portable food quality assessment device has been developed based on App-based display. The system comprises of Arduino UNO-based function generator with a signal conditioning unit, a potentiostat circuit, Arduino Nano-based output response sampler, a data acquisition, and a display through a user interface.