A comparative study of conductometric and electrochemical sensing platform for Early Ovarian Cancer Biomarker Detection

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Abstract:
Ovarian cancer is one of the leading causes of death among women worldwide. While it has a lower prevalence compared to breast cancer, it is three times more lethal [1]. Unfortunately, ovarian malignancies often go unnoticed due to a lack of symptoms, and when symptoms do arise, they are frequently mistaken for gastrointestinal issues or other common ailments [2]. Despite the availability of traditional diagnostic methods, there is still a need to develop an effective, highly sensitive, low-cost, and portable biosensor capable of detecting low concentrations of biomarkers to aid in the diagnosis and prognosis of ovarian cancer [3, 4].

The current study aims to analyse the performance of electrochemical and conductometric platforms for early diagnosis of cancer antigen 125, a prominent early ovarian cancer biomarker that has been extensively studied for early detection of the disease [5]. The current study compares various parameters of sensing platforms like sensitivity, reproducibility, selectivity, etc for their performance and potential for integration into point-of-need devices. Additionally, the influence of sample matrix complexity and interference effects are investigated to assess the robustness of each method in clinical applications.

Both highly sensitive methods are utilised for the detection of the cancer antigen CA-125 spanning a broad concentration range from fM to nM, encompassing the clinical range observed among patients from diverse demographics.

Keywords: Point-of-need biosensors, ovarian cancer, Alkyl-Aminated graphene, conductometric, Cancer antigen 125, electrochemical

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