LASER INDUCED BREAKDOWN SPECTROSCOPY (LIBS) FOR THE DETECTION OF CA125 USING APTAMER-CA125 BASED IMMUNOASSAY

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Epithelial ovarian cancer (EOC) is one of the deadly cancers among the women. The higher mortality can be attributed to the lack of early symptoms at early stage and lack of sensitivity and specificity of clinical methods. Developing new techniques to improve such problems is vital. In this regard, bioconjugation technique is widely researched along with various ovarian cancer biomarkers as it could potentially improve the sensitivity, specificity, and reproducibility.

This work focuses on employing laser induced breakdown spectroscopy (LIBS) in an optical based immunoassay to detect the CA125 ovarian cancer biomarker. To achieve this goal, we developed a sandwich type immunoassay utilizing the affinity of CA125 towards a specific RNA-Aptamer. In this regard, Ni-NTA (Nickel- Nitrilotriacetic acid) magnetic beads (MBs) were used to immobilize the CA125-His tag, followed by a magnetic separation process. Similarly, streptavidin modified silica micro beads were modified with a biotinylated RNA-aptamer. Once the silica modified beads were collected through centrifuging, it was then incubated with CA125 modified MBs. The final conjugate was purified by a magnet and then investigated with LIBS. The emission spectrum of silicon at 288.2 nm confirmed the sandwich type immunoassay is achieved. Further, we studied the specificity of this assay replacing CA125 with p53 (another tumor suppressing protein) and bovine serum albumin (BSA).