Supporting Information

Biocompatible Serine Functionalized Nanostructured Zirconia Based Biosensing Platform for Non-invasive Oral Cancer Detection

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Scheme, Figures and Tables Captions

**Scheme S1:** Schematic diagram of functionalization of Zirconia with (a) APTES and (b) serine molecules.

**Figure S1:** FT-IR spectrum of the serine amino acid.

**Figure S2:** Electrochemical response of BSA/anti-CYFRA-21-1/serine/nZrO$_2$/ITO immunoelectrodes with various pH of PBS buffer containing 5 mM [Fe(CN)$_6$]$_{3^-}$/$4^-$.  

**Figure S3:** Cyclic voltammetry response of ITO, serine/nZrO$_2$/ITO, anti-CYFRA-21-1/serine/nZrO$_2$/ITO and BSA/anti-CYFRA-21-1/serine/nZrO$_2$/ITO electrode.

**Figure S4:** Scan rate studies of serine/nZrO$_2$/ITO [Inset (a) magnitude of oxidation and reduction current generated as response of scan rate (mV/s), Inset (b) potential as function of scan rate] electrodes.

**Figure S5:** Scan rate studies of BSA/anti-CYFRA-21-1/serine/nZrO$_2$/ITO [Inset (a) magnitude of oxidation and reduction current generated as a function of scan rate (mV/s), Inset (b) potential as function of scan rate] electrode.

**Figure S6:** Response time studies for binding of CYFRA-21-1 with BSA/anti-CYFRA-21-1/serine/nZrO$_2$/ITO immunoelectrode.

**Figure S7:** Interferents studies of BSA/anti-CYFRA-21-1/serine/nZrO$_2$/ITO immunoelectrode in presence of various molecules present in saliva sample of oral cancer patients.

**Figure S8:** Cumulative Effects of ions present in artificial saliva on electrochemical response study of BSA/anti-CYFRA-21-1/serine/nZrO$_2$/ITO immunoelectrode.

**Figure S9:** Electrochemical response studies of five different BSA/anti-CYFRA-21-1/serine/nZrO$_2$/ITO immunoelectrodes (fabricated in same condition) as function of 0.01 ng mL$^{-1}$ concentration of CYFRA-21-1.

**Figure S10:** Shelf life studies of BSA/anti-CYFRA-21-1/serine/nZrO$_2$/ITO immunoelectrodes.

**Table S1:** Determination of CYFRA-21-1 concentration in saliva samples using BSA/anti-CYFRA-21-1/serine/nZrO$_2$/ITO immunoelectrodes
Scheme S1:
Figure S1:
Figure S2:
Figure S3:
Figure S4:
Figure S5:
Figure S6:
Figure S7:

![Bar chart showing current (mA) for different interferents: a = CYRRA-21-1, b = a + NaCM, c = b + Glu, d = c + KCl, e = d + CaCl₂, f = e + NaCl, g = f + CEA.](image-url)
Figure S8:
Figure S9:
Table S1:

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<th>S. No.</th>
<th>CYFRA-21-1 concentration determined using ELISA (in ng mL⁻¹)</th>
<th>Peak current (mA) obtained for standard CYFRA-21-1 samples</th>
<th>Peak current samples (mA) obtained with in Patients saliva samples</th>
<th>% RSD</th>
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