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Leveraging zinc interstitials and oxygen vacancies for sensitive biomolecule detection through selective surface functionalization NANDHINEE RADHA SHANMUGAM, SRIRAM MUTHUKUMAR, SHAJEE CHAUDHRY, SHALINI PRASAD, The University of Texas at Dallas, Richardson, TX 75080 — In this study, functionally engineered EIS technique was implemented to investigate the influence of surface functionalization on sensitivity of biomolecule detection using nanostructured ZnO platform. Organic molecules with thiol and carboxylic functional groups were chosen to control biomolecule immobilization on zinc and oxygen-terminated 2D planar and 1D nanostructured ZnO surfaces. The amount of functionalization and its influence on charge perturbations at the ZnO-electrolyte interface were studied using fluorescence and EIS measurements. We observed the dependence of charge transfer on both the polarity of platform and concentration of cross-linker molecules. Such selectively modified surfaces were used for detection of cortisol, a major stress indicator. Results demonstrated preferential binding of thiol groups to Zn terminations and thus leveraging ZnO interstitials increases the sensitivity of detection over larger dynamic range with detection limit at 10fg/mL.

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