

Sensitive and Specific Diagnostic Assay Using Ferritin Based Nanoprobe Hydrogel

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Ferritin-based nanoprobe (FBNP) hydrogel was synthesized through a simple one-step copolymerization and used as a diagnostic assay platform to solve the traditional problems (i.e., low sensitivity and specificity, infeasibility of multiplex assays, random orientation of probes, probe instability, uncontrollable probe loading, etc.) of ELISA (enzyme-linked immunosorbent assay)-based bioassays. Here we show the advantages of the diagnostic assays based on FBNP hydrogel: probe immobilization without a random orientation problem, controllable loading of homogeneously oriented probes, protein-friendly environment, sufficient storage stability, much higher sensitivity than ELISA, and high specificity and reproducibility even in multiplex assays. FBNP hydrogel was successfully applied to the sensitive and specific diagnostic assays of acquired immune deficiency syndrome (AIDS) and Sjögren's syndrome (SS). Although the diagnostic assays of AIDS and SS were demonstrated as proof-of-concept in this study, FBNP hydrogel can be applied in general to sensitive and specific detection of many other disease markers.