Multiplexed Protein Detection with Post-Synthesis Hydrogel Microparticles

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Protein detection and quantification is increasingly becoming an important analytical practice in various applications from biopharmacy to medical diagnosis. With a growing demand for simultaneous measurement of multiple analytes in a single sample, suspension assay platforms have emerged at the forefront of multiplex protein detection. Hydrogel beads have been proposed with the purpose of integrating hydrogel's solution-like reactivity and non-fouling characteristic. However, their synthesis is deemed unreliable and delicate because the photoinitiators used for radical polymerization of hydrogels are incompatible with probe antibodies and cause antibodies to aggregate. In this work, we introduce hydrogel microparticles that are functionalized after synthesis and demonstrate their advanced multiplex protein detection performance. Our detection technique features complete elimination of antibody aggregation, high sensitivity, fast detection, and broad assay range.