Multiplexed Protein Detection using Linker-free Antibody Capsulated Hydrogel Microparticles

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Multiplexed Protein Detection suggests a new level of protein analysis across a variety of areas, such as medical diagnosis and bio-marker discovery. Because of high multiplex capacity and enhanced sensitivity compared to the enzyme-linked immunosorbent assay (ELISA), using graphically encoded hydrogel microparticles synthesized via stop flow lithography(SFL) has been a effective method for bead-based assay. The linker chemistry, which is based on linking the primary amine groups of antibodies with acrylate functional groups on the hydrogel monomer, is vulnerable to hydrolysis in aqueous conditions and can potentially damage the antigen binding region of the antibody. In this work, we introduce a new antibody conjugation method that avoids the use of the linker and enhances the sensitivity of immunoassays. Disulfide bonds in antibodies are reduced to liberate free thiols, which can directly bond with the double bonds remaining in the hydrogel after particle synthesis. We validate the accuracy and specificity of the multiplex assays with particles conjugated with antibodies using the linker-free method.