

Multiplex miRNA detection by utilizing vertically encoded tetragonal hydrogel microparticles

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Encoded hydrogel particles have gained much attractions in diagnostic fields as the particles can be used for multiplexed assays with high sensitivity and specificity. Here, we introduce encoded tetragonal hydrogel microparticles that consist of vertically distinct code and probe regions. In code region, quantum dots (QDs) were incorporated to identify each different probes. Due to the particle geometry, particles can be synthesized at a high production rate in vertically stacked micro-flows using hydrodynamic focusing lithography. The capacity of particle codes can be largely expanded by changing wavelengths of QDs and the number of code layers. To increase the layer of particle, we developed hydrodynamic model for the precise control of layers. We also show the multiplexed capability of the particles in a miRNA assay and prove the possibility of using these particles in the clinical diagnostic field.