Optofluidic Encoding of Microparticles Based on Double Emulsion Droplets

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Particle-based suspension arrays have attracted much attention due to their special advantages in biological screening or multiplex immunoassays, which show high flexibility in target selection, faster binding kinetics and less expensive production in comparison with conventional planar arrays. In this paper, we report novel optofluidic encoding technique based on photocurable double emulsion droplets. The double emulsion droplets could be generated with microfluidic devices through sequential drop break-off. With precisely controlled flow rates of inner, middle, and outer streams, we could prepare encoded microparticles with red, green, and blue colored cores after photopolymerization of the shell phase. In addition, the surface of microparticles was decorated with silica nanoparticle arrays, which gives functional groups for binding of biomolecules. The combination of spectrometric and graphical encodings in present approach enabled simple and fast decoding, easy code expression and abundant number of codes.