

Multilayer Deposition on Patterned Posts in a Microfluidic Device by Alternating Polyelectrolyte Droplets

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We demonstrate that polyelectrolyte (PE) multilayer thin films deposited on posts with a large number of bilayers can be obtained in short process time using alternating polyelectrolyte droplets in a microfluidic channel, which clearly represent the advantage over the conventional process based on the polyelectrolyte deposition followed by the separation of such substrates with centrifuge. Positively and negatively charged polyelectrolyte droplets in a microfluidic channel were alternatively generated by controlling the Capillary Number and the fraction of dispersed droplets over the continuous phase. Patterned posts, serving as PE deposition substrates, were created with photo-curable polymers using the optofluidic maskless lithography. The impact of these PE droplets on the patterned posts enabled the alternative adsorption of PEs, similar to the layer-by-layer (LbL) deposition method. It was shown that the intensity of fluorescence dye labeled onto PEs increases with the deposition time or period and angle dependent fluorescence intensity was also compared with the flow simulation, showing good qualitative agreement.