

Active Concentration of Nanoparticles on Microfluidic System with Nanoporous Structure

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Hydrogel-based active platform has been extensively investigated because it is easy to position at microfluidic system by photo-polymerization and can be applied for both sensing and actuation functions simultaneously. Here we propose active concentration on microfluidic system which is prepared by combining pH sensitive hydrogel microvalve with patterned polymeric inverse opal structure. To integrate the inverse opals on microfluidic chip, colloidal particles are crystallized on photocurable polymer thick film first. By using conventional photolithographic method, the colloidal crystals were patterned in micron scale then incorporated into microfluidic channel. Hydrogel valves could be fabricated by in situ photopolymerization in microfluidic channel. Finally, hydrogel-based microfluidic concentrator system was applied to concentrate the nanometer-sized analytes by actuating the pH-sensitive hydrogel with buffer and applying DC field to induce the flow of analytes.