

Microfluidic Fabrication of Photonic Microgels for Measurement of Local pH and its Distribution

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The periodic nanostructures cause the special photonic effect. These structures generate photonic bandgap, and this results the reflection of selected wavelengths. Reflection wavelength is fixed as the distance of nanoparticles in photonic crystals.

In this study, we suggest 3D pH sensors using pH responsive polymer as photonic crystal matrix materials. We fabricate microgels photonic crystal structure microgels using microfluidic system. Microfluidic system can fabricate monodispersity micro size emulsions, and we use the monomer solution added silica nanoparticles as emulsions material. We can get micro photonic gels, which have periodic pores in a polymer matrix after gelation and removing silica particles process. The material of microgels is pH-responsive polymers, so fabricated microgels is swells as change of pH levels. This swelling change the distance of pores, bring on the changing of microgels color. This platform can provide important information of the 3D-pH map in highly pH dependency system such as metabolome conditions, cancer cell environment and etc.