Electronic Supplementary Information

Structural colored fiber fabricated by a facile colloid self-assembly method in micro-space

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Experimental section

In typical experiment, silica glass capillaries (GL Science, Japan) with an inner diameter of 530 μm and a polyimide outer coating were used as the microchannels. The inner surface was rinsed with a mixture of sulfuric acid/peroxide/distilled water, ammonia/peroxide/distilled water and distilled water sequentially, and then dried in an oven. Monodisperse silica colloids were prepared following the Stöber-Fink-Bohn sol gel synthesis. [W. Stöber, A. Fink, E. Bohn, J. Colloid Interf. Sci, 1968, 26, 62] In a typical synthesis, 72 mL ethanol, 9 mL distilled water, and 3.5 mL ammonia were mixed in a 150 mL three-neck flask. The mixture was stirred vigorously for homogenization. Then, a mixture containing 7 mL tetraethyl orthosilicate (TEOS) dissolved in 28 mL ethanol was added. The reaction proceeded at room temperature under continuous stirring for 2 h. The synthesized silica dispersions were purified and redispersed in 50 mL ethanol. Subsequently, a silica optical fiber (300 μm) was put into the microcapillary. Silica spheres of 180 nm, 215 nm, and 240 nm in a mixture of water and ethanol were used as the raw materials for the particle arrangement. Using a syringe, the silica suspension was injected into a 30 cm long capillary through a Teflon tube (all bubbles should be avoided). A part of the capillary (-25 cm) was horizontally placed in an oven (70~90 ^{o}C). An interface (meniscus shape) between the suspension and air was visually observed to continuously move along the capillary from the open side to the closed side (syringe side). After several minutes the capillary was cut when meniscus was close to the door of a oven and then dried

overnight at 90 ^{o}C.

The structural colored fiber was characterized by Field-emission scanning electron microscopy (FE-SEM, S-4800, Hitachi), optical microscopy (XPF-550, Caikon) mounted on a CCD camera (TCC, 3.3 ICE), UV-vis spectrophotometer with focusing specimen holder (Lambda-950, Perkin-Elmer).