

SUPPORTING INFORMATION FOR:

Fabrication of Optically Active Flexible Polymer Films with Embedded Chain-like Arrays of Silver Nanoparticles

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Experimental Procedures

Highly polished single-crystal silicon wafers of {100} orientation (Semiconductor Processing Co.) were used as a substrate. The wafers were first cleaned in an ultrasonic bath for 30 minutes, placed into a hot piranha solution (3:1 concentrated sulfuric acid/30% hydrogen peroxide) for one hour, and then rinsed several times with high purity water (18 M Ω , Nanopure).

Glycidyl methacrylate (Aldrich) was polymerized radically to yield PGMA, M_n =58,000 g/mol, PDI=1.57. The polymerization was carried out in methyl ethyl ketone (MEK, VWR) at 60°C. AIBN (Aldrich) was used as an initiator. The obtained polymer was purified by multiple precipitations from MEK solution in diethyl ether. PGMA was dissolved in CHCl₃ at 0.07% w/v and thin films (~2nm) were deposited onto the substrate by dip coating and annealed for 15 min at 110°C.

A PDMS mold for CFL was made by curing Sylgard 184 resin from the surface of the cleaved DVD-R disk (top part of the disk was used, preliminarily rinsed with methanol to remove dye).

A 15 nm thin PS (M_w =280,000 g/mol) film was deposited onto the wafer's surface by dip coating from a toluene solution. AFM demonstrated (image not shown) that the substrate was completely covered with an extremely smooth PS film (AFM roughness, 0.2 nm). Next a PDMS

mold was utilized to selectively dewet the ultrathin PS film by employing CFL. The lithography was conducted at 130°C for 20 min.

A thick layer (ca 30 nm) of carboxy terminated PVP was deposited on top of the patterned (with PS resist) PGMA layer from MEK and placed into sealed tubes with water vapor for grafting. Grafting was done for 20-24 hours at 40°C. After grafting, the wafers were rinsed repeatedly with MEK and sonicated for 10 minutes to remove ungrafted polymer chains.

Ag NP were synthesized as described elsewhere [Evanoff, D. D.; Chumanov, G. *Chemphyschem* **2005**, 6, (7), 1221-1231]. They were adsorbed to the sample from water suspension during 24 hrs. UV-vis measurements were done on Shimadzu UV-2501PC spectrometer.

Ellipsometry was performed with a COMPEL automatic ellipsometer (InOmTech, Inc.) at an angle of incidence of 70°. Original silicon wafers from the same batch and silicon wafers with a PGMA layer were tested independently and used as reference samples to analyze the grafted polymer layers. Ellipsometry and atomic force microscopy were done after each stage of the experiments.

AFM studies were performed on a Dimension 3100 and MultiMode (Digital Instruments, Inc.) microscopes. We used the tapping mode to study the surface morphology in ambient air. Silicon tips with spring constants of 50 N/m were used. Imaging was done at scan rates in the range 1-2 Hz.