

Supplementary Information

Spontaneous Formation of Radially Aligned Microchannels

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Experimental

Dodecanethiol-stabilized AuNPs with an average diameter of 4 nm were synthesized according to a two-phase method.¹ PS with an average molecular weight of 250k was purchased from ACROS Organics. The patterned thin films were prepared by dropping the mixed solution of PS and AuNPs in chloroform onto glass substrates and dried under ambient conditions. Unless specified, a 5 μL chloroform solution containing 5.0 g L^{-1} AuNPs and 2.5 g L^{-1} PS was used in all experiments. For the control experiment, 5 μL of PS solution in chloroform (2.5 g L^{-1}) without AuNPs was cast on glass substrate under the same conditions. The morphology of prepared surface patterns were characterized with an optical microscope (Zeiss Axioskop 40), field-emission scanning electron microscopes (JEOL JSM-6700F and Hitachi S-4800), and a scanning probe microscope (Veeco NanoScope IIIa). Real time observations of pattern formation were performed on an optical microscope (Zeiss Axioskop 40). HRTEM images of AuNPs were obtained with a high-resolution transmission electron microscope (JEOL JEM-2010) at an acceleration voltage of 200 kV.

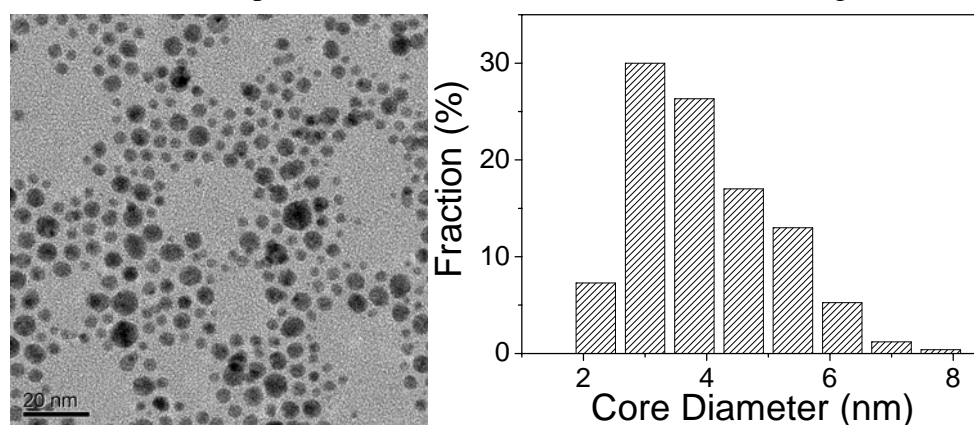


Fig. S1 TEM image of dodecanethiol-stabilized gold nanoparticles (left) and the corresponding size distribution histogram (right).

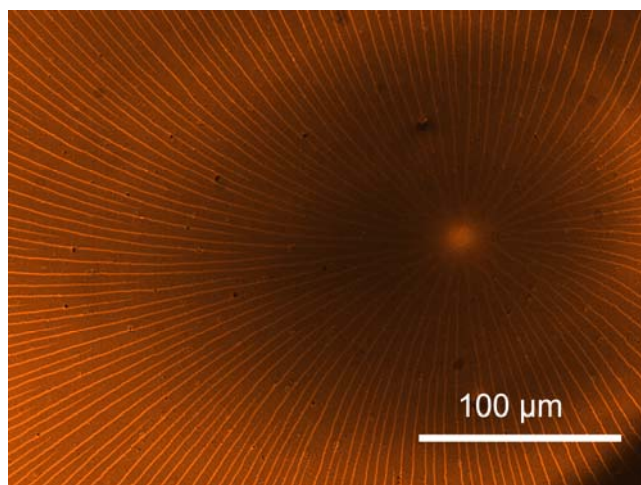


Fig. S2 Optical micrograph measured at the center of a drop-cast AuNP-polymer nanocomposite thin film.

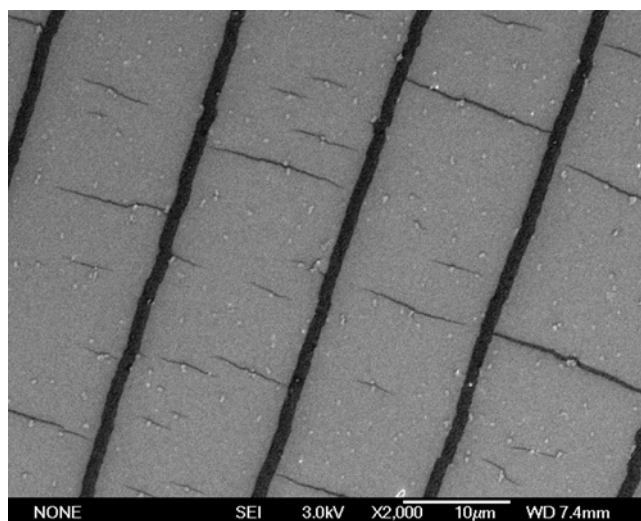


Fig. S3 SEM image of a drop-cast AuNP-polymer nanocomposite thin film.

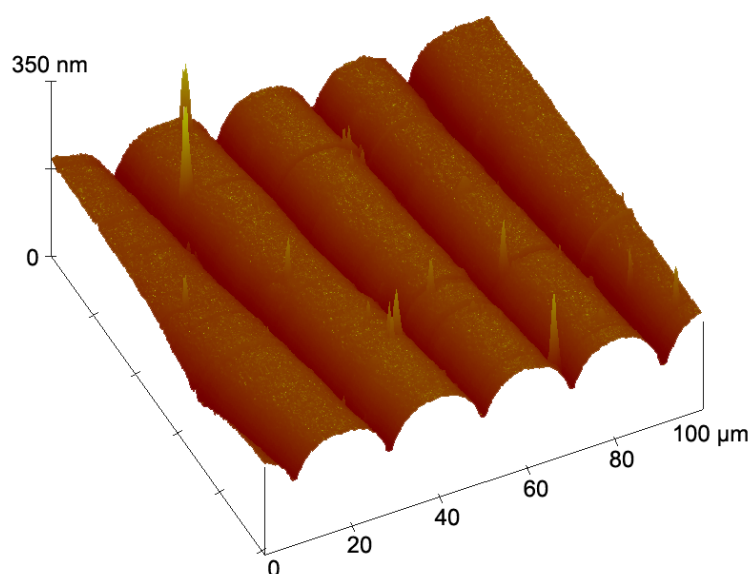


Fig. S4 The three dimensional topography of a drop-cast AuNP-polymer nanocomposite thin film.

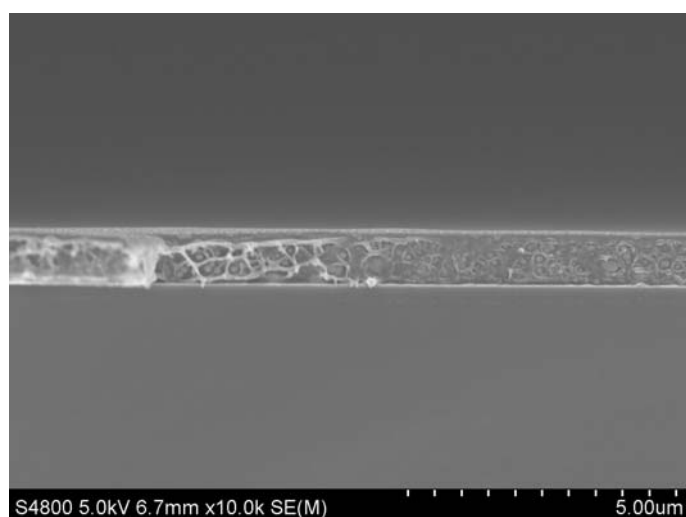


Fig. S5 Cross sectional SEM image of a drop-cast AuNP-polymer nanocomposite thin film.

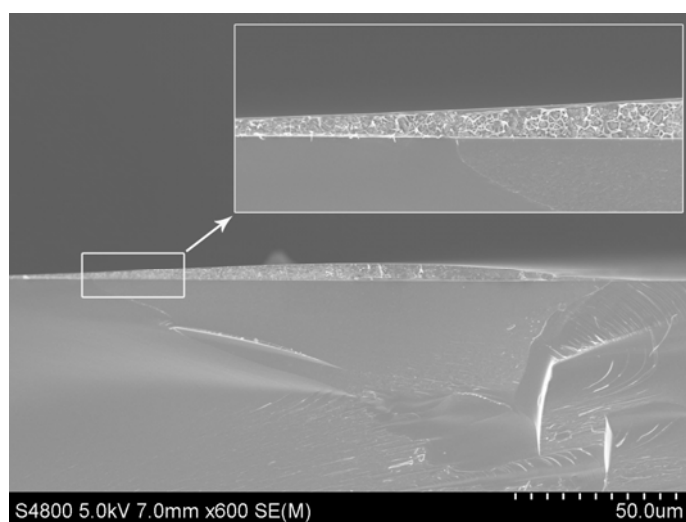


Fig. S6 Cross sectional SEM image of a drop-cast polymer nanocomposite thin film at its edge. The broad hump corresponds to the "coffee ring" border. Inset: an 8x enlargement of the indicated cross section of the film.

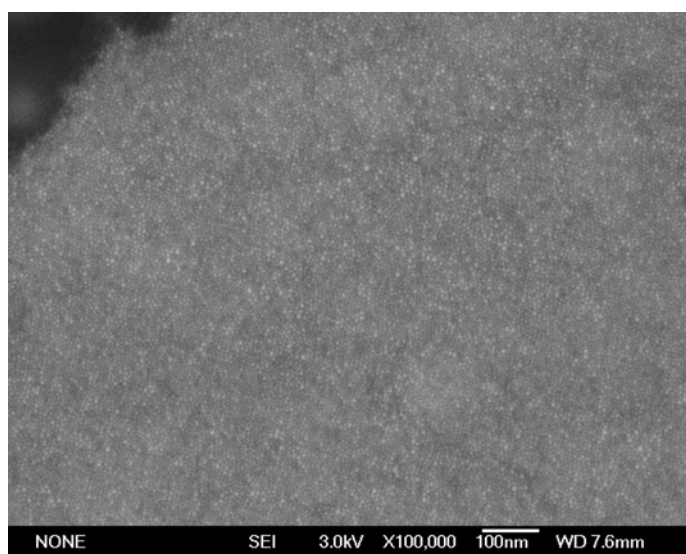


Fig. S7 SEM image of the drop-cast AuNP-polymer nanocomposite thin film without metal coating.

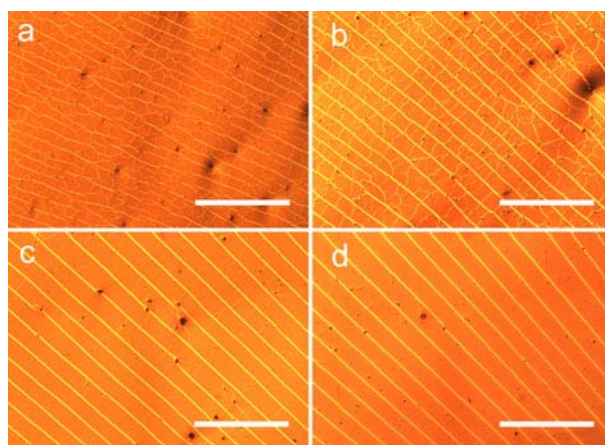


Fig. S8 Optical micrograph of drop-cast polymer nanocomposite thin films prepared from solutions with different PS concentrations: (a) 0.5, (b) 1.0, (c) 2.5, (d) 5.0 g L⁻¹. The casting solution contains 5.0 g L⁻¹ AuNPs. The scale bar is 100 μm.

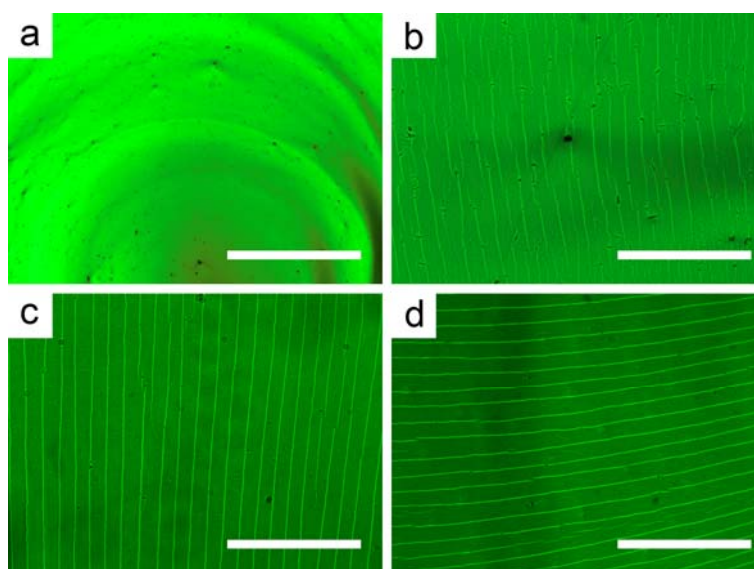


Fig. S9 Optical micrograph of drop-cast AuNP-polymer nanocomposite thin films prepared from solutions with different AuNP concentrations: (a) 1.0, (b) 2.0, (c) 4.0, (d) 5.0 g/L. Each casting solution contained 2.5 g/L PS. The scale bar is 100 μm.

1 J. C. Hu, P. Y. Su, V. Lapeyronie, S. L. Cheng, M. Y. Lin and L. J. Chen, *J. Electron. Mater.*, 2004, **33**, 1058-1063.