Supplementary Material (ESI) for Chemical Communications

Supporting information

Oriented cells growth on self-assembled bacterophage M13 thin films

Jianhua Rong,[a,b] L. Andrew Lee,[a] Kai Li,[a] Brandon Harp,[a] Charlene M. Mello,[c] Zhongwei Niu,[a*] Qian Wang [a*]

[a] *Department of Chemistry and Biochemistry and Nanocenter, University of South Carolina, Columbia, SC, 29208, USA. E-mail: wang@mail.chem.sc.edu; niu.z@mail.chem.sc.edu.*
[b] *Department of Materials Science and Engineering, Jinan University, Guangzhou 130025, P. R. China*
c Bioscience and Technology Team, US Army Natick Soldier Research Development & Engineering Center, Natick, MA 01760, USA

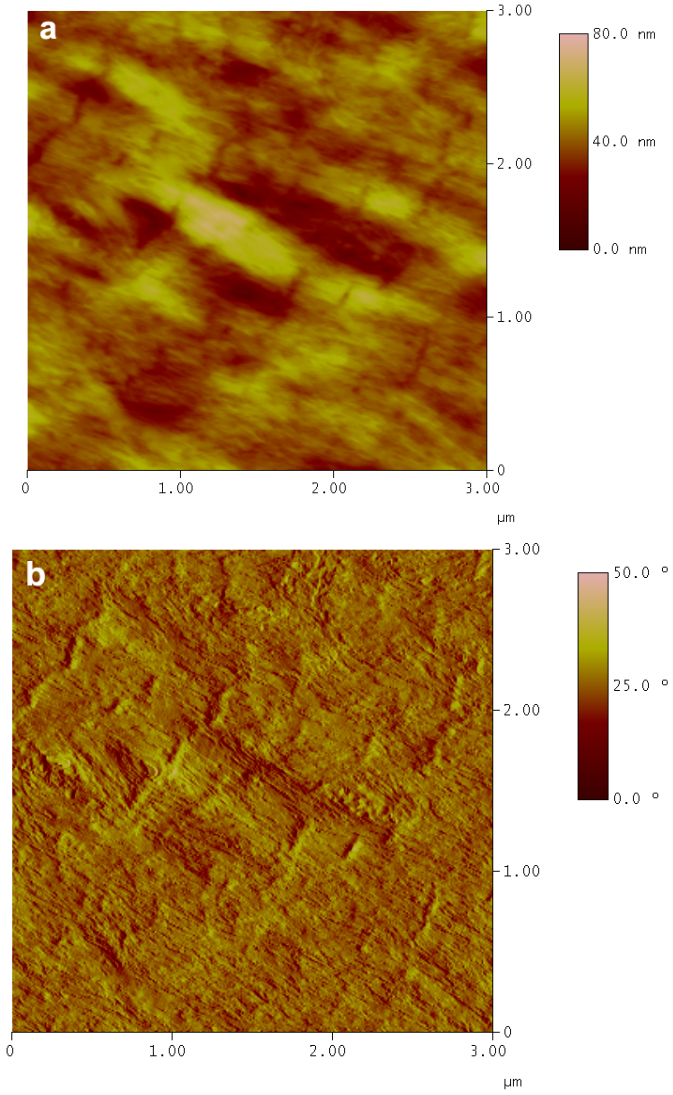

Figure S1. AFM images of aligned M13 thin film: a) height image and b) phage image.

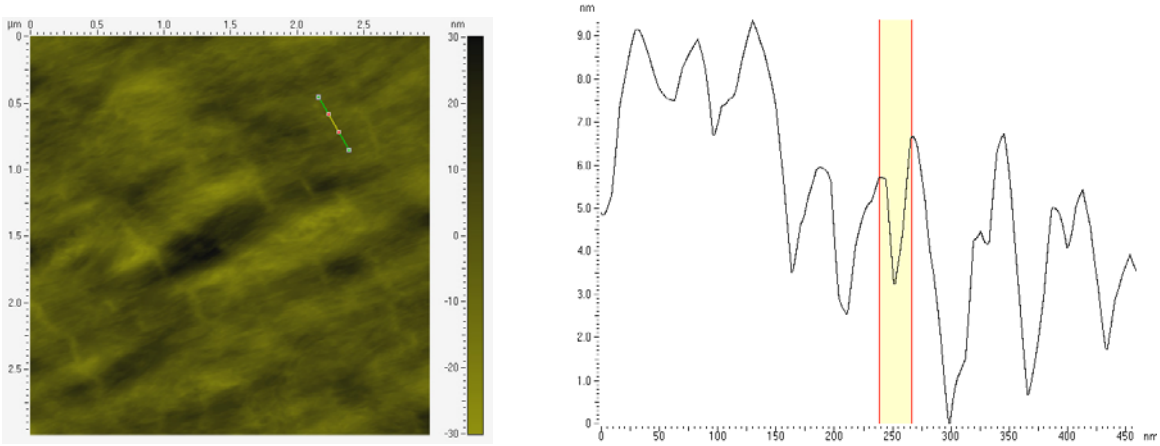

Figure S2. AFM height image (left) and the height profile (right) of aligned M13 thin film along the green line marked in the left image.

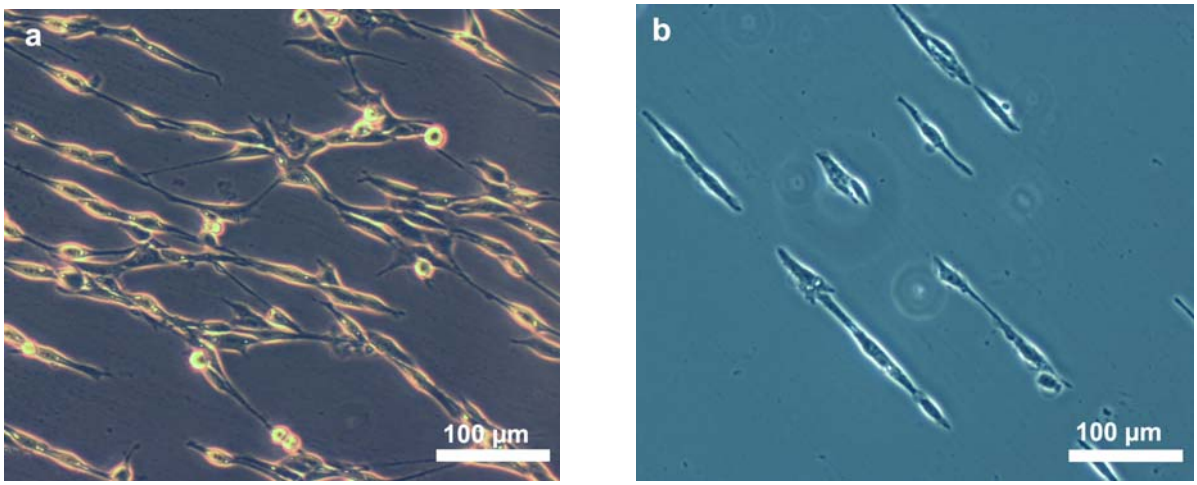

Figure S3. Optical images of a) NIH-3T3 cells cultured on aligned M13 thin film, and b) CHO cells cultured on aligned M13 thin film, which clearly show the elongated features of both cells.

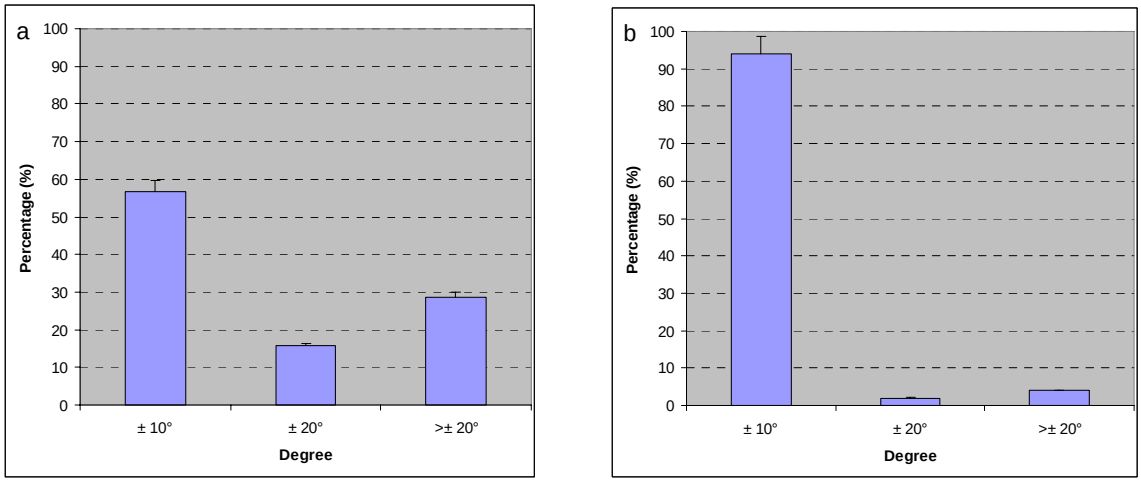

Figure S4. The distribution of angles between the long-axis of cells and the orientation of M13 particles within the aligned films: a) NIH3T3 cells and b) CHO cells. When culturing on normal Petri dish, the angles are evenly distributed from 0 to 90^{o}.

Synthesis of RGD modified M13

With a two-step protocol, the RGD-M13 can be readily prepared. 2,5-Dioxopyrrolidin-1-yl 5-(4-ethynylphenylamino)-5-oxopentanoate (68.8 mg/mL, 320 µL) was mixed with M13 solution (10.2 mg/mL, 4 mL) in 0.01 M pH 7 PBS buffer. Upon gently shaking at 4 °C overnight, the precipitation was removed by centrifugation at 14,000 *g* for 15 min. The clear solution was further purified by dialyzing against PBS buffer using a MW 100k Da dialysis tube to remove un-reacted alkyne molecules.

For copper(I)-catalyzed azido-alkyne cycloaddition reaction, RGD azide (100 mM, 55 µL) was introduced into alkyne modified M13 PBS solution (4.3 mg/mL, 925 µL), and $CuSO_4$ (100 mM, 10 µL) and sodium ascorbate (200 mM, 10 µL) were added. Upon incubation overnight at room temperature, the reaction mixture was purified as previously described.

Fabrication of M13 thin film

As shown in ***Figure S5***, the angle between normal glass slide **a** and silane coated glass slide **b** (Lab Scientific Inc.) was fixed to 6 °. A solution of bacteriophage M13 (20 mg/mL, 100 µL) was first deposited on glass slide **b**. A motor was then attached to glass slide **b** to control the

withdrawing speed. With the constant slow dragging slide **b** at the speed of 5 μm/s, the aligned virus thin film was formed.

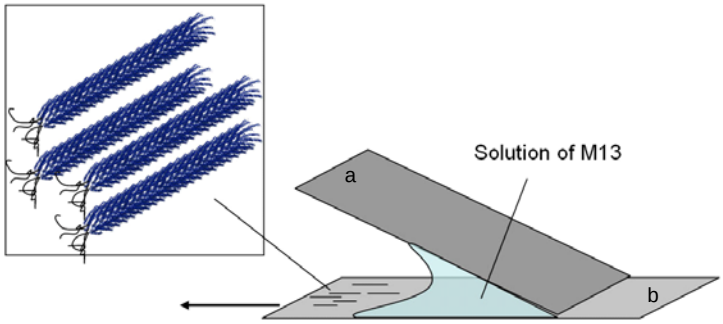

Figure S5. Schematic illustration of preparation of aligned M13 thin film.