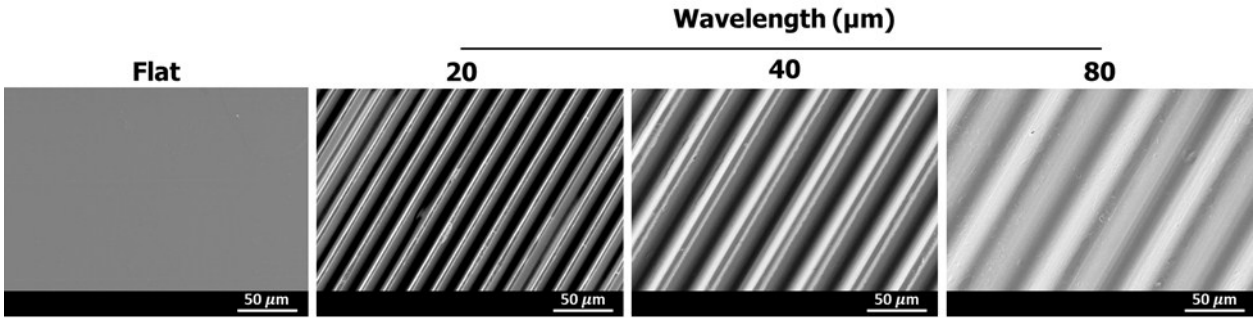
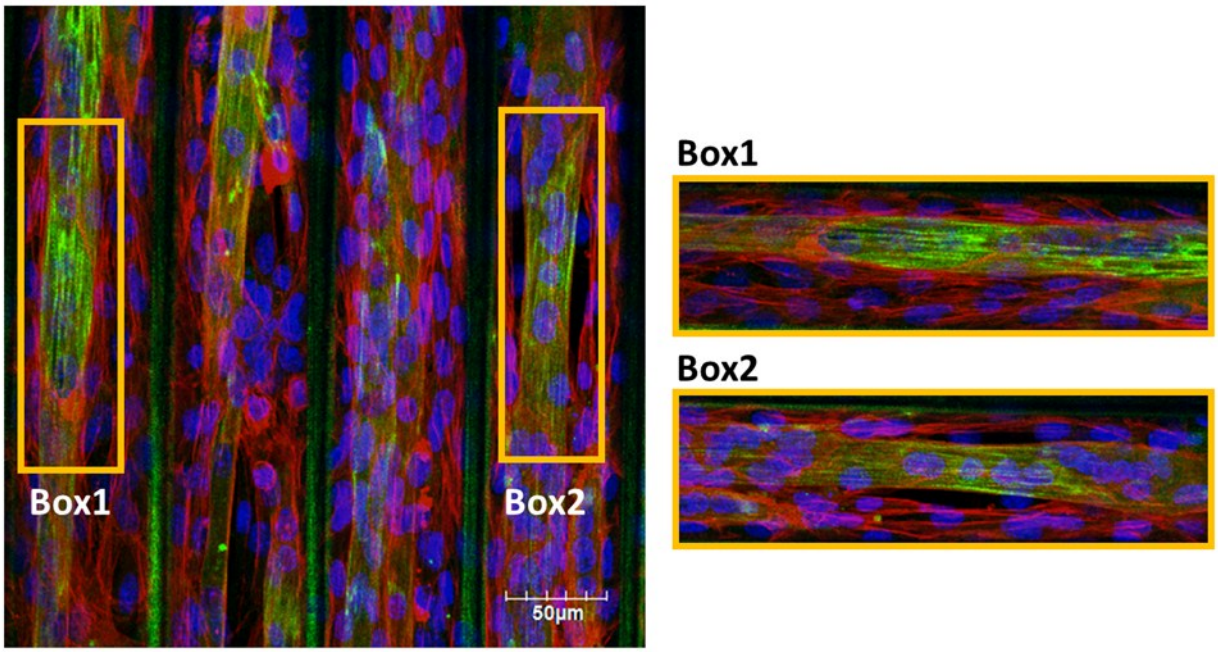
Electronic Supplementary Material (ESI) for Journal of Materials Chemistry B.



Supplementary Fig. 1. Representative cross-sectional SEM images of sinusoidal wavy surfaces.



Supplementary Fig. 2. Representative striated patterned myotube formation on mSW_{80}. Boxes 1 and 2 indicate the striated patterned myotubes. Green indicates the myosin heavy chain, red indicates F-actin, and blue indicates the nuclei (DAPI). Scale bar = 50 μm.

Fabrication and characterization of ECM-coated sinusoidal wavy surfaces

Polystyrene (PS) substrates containing sinusoidal wavy surfaces were fabricated based on a deep X-ray LIGA process previously described.[1] In the X-ray lithography, the first step of LIGA, thick polymeric structures with sinusoidal wavy sidewalls were generated for use as an electroforming template. To define the structures, a 1.1-mm-thick polymethyl methacrylate (PMMA) sheet (Goodfellow Cambridge Ltd.) bonded to graphite was selectively exposed to high-energy X-rays from a LIGA beam line at the Pohang Light Source (9D beamline at PLS) through an X-ray mask. The exposed PMMA regions were dissolved by the GG-developer ((di-(ethylene glycol) butyl ether 60%, morpholine 20%, 2-aminoethanol 5%, and DI water 15%), thereby achieving an electroforming template. Based on this template, nickel was thickly deposited on the opened regions of the template through an electroforming process in a nickel sulfamate bath (current density 8.5 mA/cm^2). After the electroforming, the electroformed nickel parts were precisely polished to make metallic mold inserts. The mold inserts were reoriented to make the sinusoidal sidewalls horizontal and assembled with jig blocks to increase the surface area to be replicated. A flat PS (Dow Chemical) plate was used for replicating a sinusoidal wavy surface in a hot embossing process at 130 °C and 3 MPa for 3 min using the assembled mold inserts. The replicated PS substrate contained the sinusoidal wavy surfaces with amplitude of 20 μm and step-gradient wavelengths of 20, 40, and 80 μm. The sinusoidal wavy surfaces were exposed to oxygen plasma for 30 s using a plasma machine (VITA, Femto Science) operating at a power of 50 W.

Topography of the replicated PS substrates was examined using scanning electron microscopy (SEM, Hitachi-SU6600, Hitachi, Tokyo, Japan) at 5 kV. In the SEM examination, the substrates were coated with titanium using a sputter coater (Ion Sputter E-1045, Hitachi) for 120 s.

The substrates were sterilized with 70% ethanol before the ECM coating. The mdECM solution was diluted with 0.5 M acetic acid to a final concentration of 2 mg/ml; and 2 mg/ml of Col I solution was used as a control coating material. The solutions were placed onto the PS substrates containing sinusoidal wavy surfaces and incubated for 1 h at 37 °C. The coated substrates were washed three times with PBS and stored at 4 °C until further use.

The contact angles of water droplets on the ECM-coated substrates were measured using a SmartDrop (FemtoBioMed). To visualize the deposition of ECM components on the substrates, the ECM-coated substrates were incubated with anti-collagen type I antibody (1:200 dilution, Abcam) overnight at 4 °C followed by staining with Alexa Fluor 488-conjugated secondary antibody (1:200 dilution, Invitrogen). X-ray photoelectron spectrometry (XPS, Quantera SXM, ULVAC-PHI) was used to investigate the atomic chemical composition of the coated substrates.

1. K. H. Song, S. J. Park, D. S. Kim and J. Doh, *Biomaterials*, 2015, **51**, 151-160.