ADVANCED MATERIALS

Supporting Information

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SUPPORTING INFORMATION

Serum-free cell adhesion

The primary adhesion of human umbilical vein endothelial cells (HUVEC) was assessed on different coatings. Following trypsinisation and washing with EGM-2, HUVEC were rinsed and finally resuspended in serum-free growth medium (EGM-2 without FBS). Cells were then seeded at 35'000 cells/cm^2 (125 µl) onto the different substrates previously covered with 2 ml EGM-2, containing or not FBS depending on the samples. Samples were then incubated under normal cell culture conditions, and cell morphology was monitored and photographed under a phase contrast microscope (TE300; Nikon, Tokyo, Japan) equipped with a Nikon F70 camera. While the cells requested serum to adhere onto uncoated indium tin oxide or normal tissue culture dishes, they attached when the surface was functionalized with RGD even in serum-free conditions.

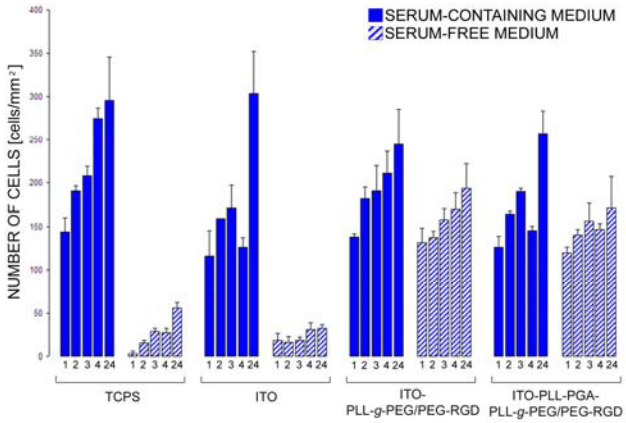

Figure S1. Primary adhesion of HUVEC under serum-free conditions: the number of adherent cells per unit area (1 mm2) was counted 1, 2, 3, 4 and 24 hours after seeding onto TCPS, ITO, ITO-PLL-g-PEG/PEG-RGD and ITO-PLL-PGA-PLL-g-PEG/PEG-RGD. For each substrates, primary adhesion was assessed under normal cell culture conditions (plain bars) and under serum free conditions (dashed bars). Error bars are standard deviation of 3 counts.

Adhesion, cell sheet recovery by spontaneous detachment and cell sheet recovery by electrochemical polarization

Table S1 summarize the adhesion (A), cell sheet recovery by spontaneous detachment (SP) and cell sheet recovery by electrochemical polarization (EP) of different cell types on the variety of polyelectrolyte coatings tested.

		RCO			NIH3T3			BAEC			HUVEC			HepG2			HeLa			HPDL		
		A	SP	EP	A	SP	EP	A	SP	EP	A	SP	EP	A	SP	EP	A	SP	EP	A	SP	EP
TCPS		+	-		+	-		+	-		+	-		+	-		+	-		+	-	
ITO or TiO2	-	+	-		+	-		+	-		+	-		+	-		+	-				
	PLL	+	+		+	+		-	-		+	-		+	-		+	-		+	+	
	PLL-HA	+	+					-	-		-	-								+	+	
	PLL-PGA										-	-										
	PLL-HA-PLL	±	+																			
	(PLL-HA)2	±	+																			
	(PLL-HA)2-PLL	±	+																			
	FN	+																				
	PLL-FN	+	+					+	-					+	-		+	-				
	PLL-HA-FN	+						-	-													
	PLL-HA-PLL-FN	+																				
	(PLL-HA)2-FN	+	+																			
	(PLL-HA)2-PLL-FN	+	+																			
	(PLL-PGA)4-PLL-FN										+	-										
	PLL-*g*-PEG/PEG-RGD	+	-	+	+	-	+	+	-	-	+	-								+	-	
	PLL-HA-PLL-*g*-PEG/PEG-RGD	+	+		+	+		+	-		+	-		+	-					+	+	
	PLL-PGA-PLL-*g*-PEG/PEG-RGD				+	+	+	+	-	-	+	-										
	(PLL-HA)2-PLL-*g*-PEG/PEG-RGD	+	+		+	+		+	-					+	-							
	(PLL-PGA)2-PLL-*g*-PEG/PEG-RGD										+	-	-									
	(PLL-PGA)3-PLL-*g*-PEG/PEG-RGD										+	-	-									
	(PLL-PGA)4-PLL-*g*-PEG/PEG-RGD										+	-	±									
	(PLL-PGA)5-PLL-*g*-PEG/PEG-RGD										+	-	±									

Table S1. Cell adhesion is marked "+" if it was comparable to the one on normal TCPS dishes upon observation by phase contrast microscopy; "±" if the number of adherent cells was slightly reduced compare to normal TCPS dishes; "-" if a clear reduction of cell adhesion was observed. For spontaneous peeling of the cell sheets, "+" means that the cells detached as a cell sheet without any external stimulus, or upon slight agitation of the surrounding medium; "-" indicates that the cells remained attached on the substrate even upon rinsing. For electrochemical peeling, "+" means that the cell sheet detached from the surface after electrochemical polarization, "±" means that the cells partially detached at localized area, mostly as single cells or as small group of cells, and "-" means that the cells remained attached to the substrate after electrochemical polarization and rinsing.

Scanning electron microscopy

Fibroblasts (NIH3T3) sheets recovered upon spontaneous detachment from polyelectrolyte films were compared to the one harvested from PIPAAm-grafted dishes upon lowering temperature. Fibroblasts were seeded at 400'000 cells/cm2 and let grown for 1 day under normal cell culture conditions. Cell sheets grown on PIPAAm-grafted dishes were recovered by incubation for 20 minutes at 20°C. Cell sheets grown on the polyelectrolyte coatings detached spontaneously from the substrate. Harvested cell sheets were fixed with 2% glutaraldehyde in 0.1M sodium phosphate buffer solution (pH 7.3) at 4°C and then 2% osmium tetroxide in the same buffer solution at 4°C for 2h. Fixed samples were dehydrated by a graded ethanol and t-butyl alcohol series, lyophilized overnight, and coated with osmium. Then the basal surfaces of the sheets were examined by scanning electron microscopy (Hitachi S-800, Hitachi, Ibaraki, Japan). The cells recovered from the polyelectrolyte coatings showed a round morphology compare to the one harvested from temperature-responsive dishes.

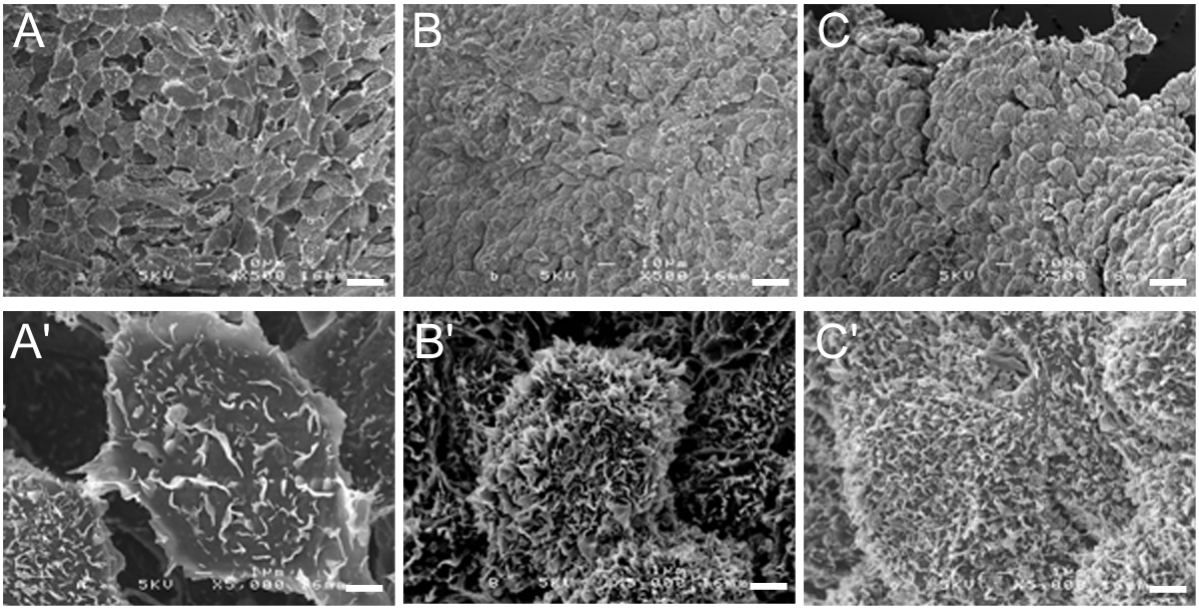

Figure S2. Scanning electron microscopy images of the basal membranes of cell sheets harvested from PIPAAm-grafted dishes upon lowering temperature (A and A'), spontaneously detached from ITO-PLL (B and B'), and spontaneously detached from ITO-PLL-HA-PLL-g-PEG/PEG-RGD (C and C'). Bars are 20 µm for A, B and C and 2 µm for A', B' and C'.