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Supporting Information

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for

Microfluidic Lithography to Create Dynamic Gradient SAM Surfaces for Spatiotemporal Control of Directed Cell Migration

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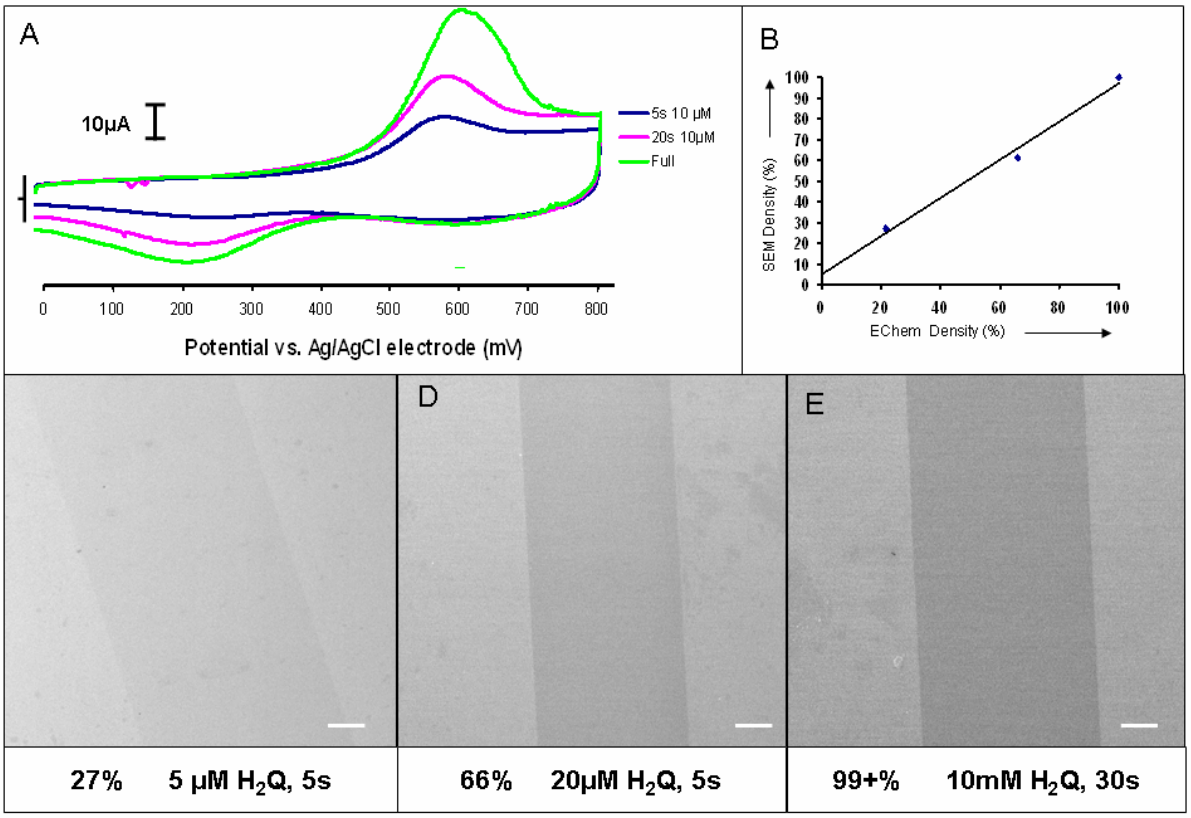

Figure S1. SEM and cyclic voltammetric correlation of H_2Q alkanethiol patterned SAMs via microfluidic lithography. A) Cyclic voltammograms of uniformly patterned H_2Q surfaces exposed to 20 µM H_2Q thiol for 5s, 20s, and their comparison to a full monolayer created by exposure to 10 mM H_2Q thiol solution for 30s. The intersection of the cross hair indicates zero current. B) Correlation plot of SEM linescan intensity (as percent full monolayer) vs. cyclic voltammetry data. The surface density of hydroquinone on the patterned surface can be precisely determined by using the equation $Q = nFAG$, where Q = the total charge in coulombs, n = number of electrons in process, F = Faradays constant, A = area of the patterned region, and G = SAM surface density (a full H_2Q monolayer has $1x10^{14}$ molecules/cm^2). (C,D,E) SEM images illustrating the different densities of H_2Q on the surface. (scale bar = 250 µm).

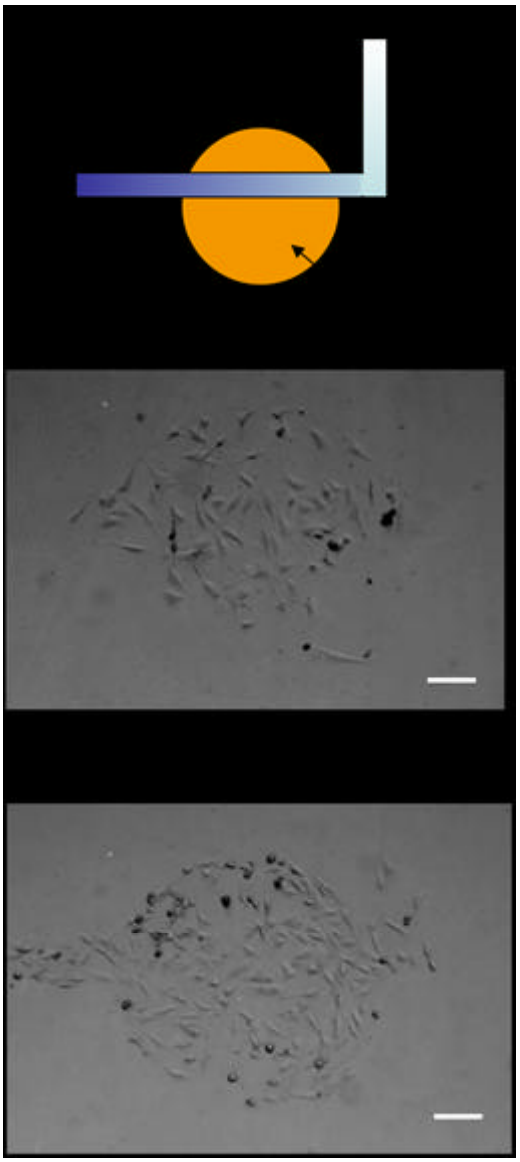

Figure S2. Combining microfluidic lithography generated gradients with microcontact printing to determine dynamic directed cell migration. (A) Circles (500 µm diameter) of hexadecanethiol were microcontact printed onto a gold surface (orange). Intersecting these features, a H_2Q gradient was patterned utilizing the µFL strategy (blue). Electrochemical oxidation converts the hydroquinone to quinone on the patterned gradient region. Cells attached and proliferated and became confluent but remained confined to the HDT circle patterns. Addition of RGD-ONH_2 (10 mM, 60 min) installed the ligand onto the gradient quinone surface and cells proceeded to migrate from the circle patterns and encountered a gradient of biospecific RGD peptides providing a choice of directional migration. Cells preferentially migrated towards higher ligand densities of surface immobilized RG live-cell fluorescence microscopy of directed cell migration on partially etched electroactive gold SAM surfaces