Cell migration on chemically and topographically modified surfaces

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Background – *D. discoideum*

- Single celled organisms that can form groups to move
- Move by chemotaxis
- Signaling causes cells to form streams

Aggregation of *D. discoideum* cells in response to a chemical signal.
Objective

- To guide cell motion through varied nanotopography and cell-scale topography
Do cells have a sense of touch?
Calculating cell speed

Speed vs. Time on 1.5hr gold nanoparticle treatment

Average cell speed (μm/min) on gold nanoparticle-coated surfaces

<table>
<thead>
<tr>
<th>Treatment</th>
<th>Speed (μm/min)</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.5hr gold nanoparticle</td>
<td>7.20</td>
</tr>
<tr>
<td>2hr gold nanoparticle</td>
<td>8.99</td>
</tr>
</tbody>
</table>
Cell-scale topography

- Micro-scale overhang ramp
- Made of acrylic resin

A cell crawls from the flattened resin onto the ramp.

A cell moves over the top ledge of the ramp and then begins to crawl back down the ramp.
Will cells fall off a cliff?

<table>
<thead>
<tr>
<th></th>
<th>Cell speed (μm/min) on resin surfaces</th>
</tr>
</thead>
<tbody>
<tr>
<td>PDMS-flattened resin</td>
<td>12.60</td>
</tr>
<tr>
<td>Ethylenediamine-coated PDMS-flattened resin</td>
<td>12.94</td>
</tr>
</tbody>
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