NANOFAB BIOTECHNOLOGY

CNST Center for Nanoscale Science & Technology

Nanoscale Surface Topography to Guide Bone Growth

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GOAL

To create a versatile substrate for understanding and controlling cell orientation in engineered biomimetic tissues in order to improve dental implants and bone restoratives.

KEY ACCOMPLISHMENTS

Designed and fabricated devices with nanoscale surface topography.

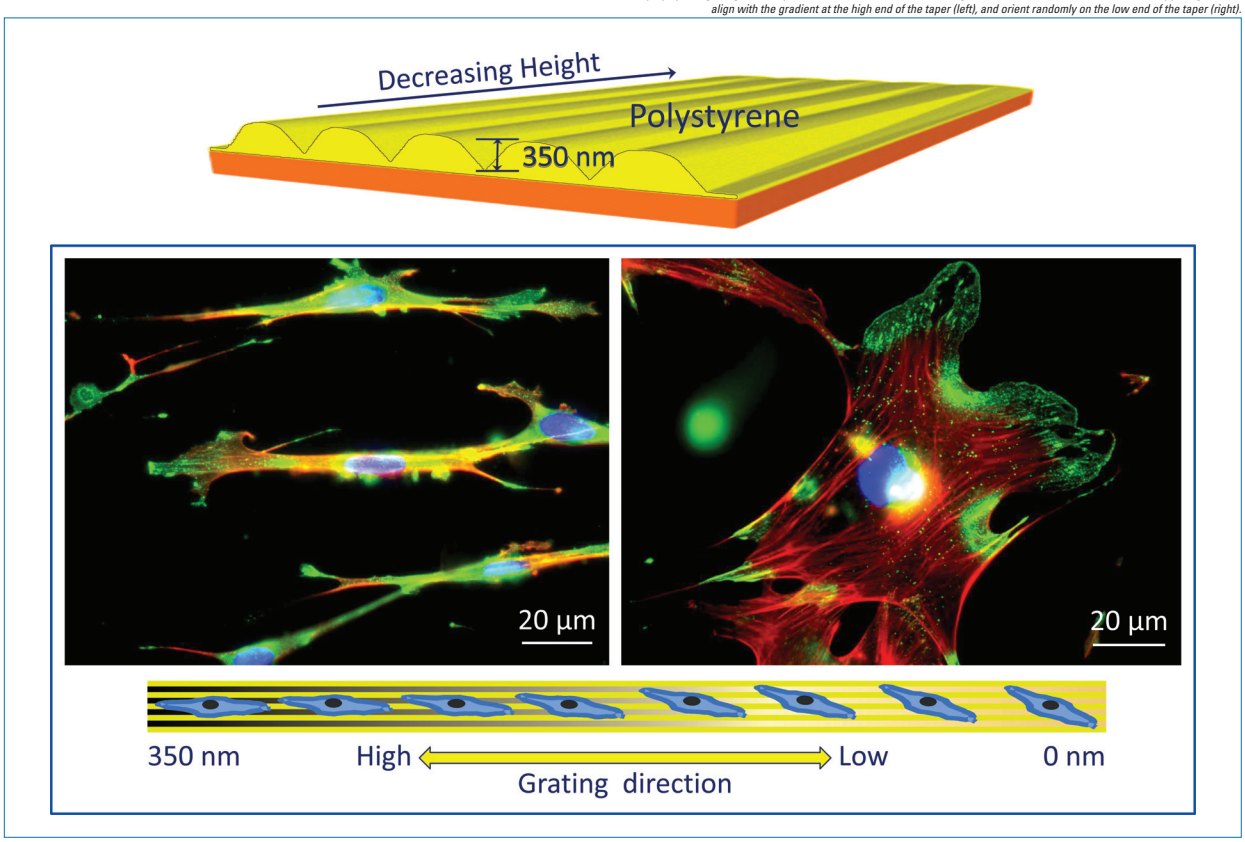
Controlled cell alignment by varying the height and aspect ratio of the surface features.

KEY NANOFAB PROCESSES

Plasma etching of high aspect ratio structures in silicon.

Nanoimprint lithography to create tapered polymer gratings.

Schematic of a polystyrene grating which tapers between 350 nm and 0 nm in height. As seen in the fluorescence microscopy images, cells align with the gradient at the high end of the taper (left), and orient randomly on the low end of the taper (right).



REFERENCE

Exploring cellular contact guidance using gradient nanogratings, J. Sun, Y. Ding, N. Lin, J. Zhou, H. Ro, C. Soles, M. Cicerone, and S. Lin-Gibson, *Biomacromolecules* **11**, 3067-3072 (2010).