Electronic Supplementary Material (ESI) for Lab on a Chip.

CAPTIONS

Supplementary Movie 1: Stem cells from apical papilla were seeded in the device, and formed a monolayer on the dentin wall within 7 hours. The arrow indicates a group of cells spreading and assembling onto the dentin.

Supplementary Movie 2: Stem cells from apical papilla were cultured on-chip and formed a monolayer after 24 hours. The cells were then incubated with a DNA dye (Helix NP NIR) that enters and stains dead cells, but is impermeable to live cells. We took images for 10 minutes as a baseline and then added 20mM of 2-hydroxyethyl methacrylate (HEMA) on the opposite side of the dentin. As HEMA diffused through dentin, the cells began to die allowing the DNA dye to penetrate and stain the cells in magenta. After 60 minutes, nearly all cells were not viable.

Supplementary Movie 3: Real-time visualization of dentin etching with 35% phosphoric acid. When acid interacts with dentin several small bubbles are observed providing proof-of-principle evidence for the capability of the tooth-on-a-chip to function as a new window of observation into the biological complexity of the tooth-biomaterials interface.

Supplementary Movie 4: Real-time visualization of the cell monolayer as dentin is being acid etched. To allow cellular visualization, we dimmed the light intensity, so dentin appears as a dark area in the center, then the acid is added on the upper chamber. The displacement of the monolayer on the left side is suggestive of contraction of cells due to exposure to phosphoric acid.