NANOHOUR

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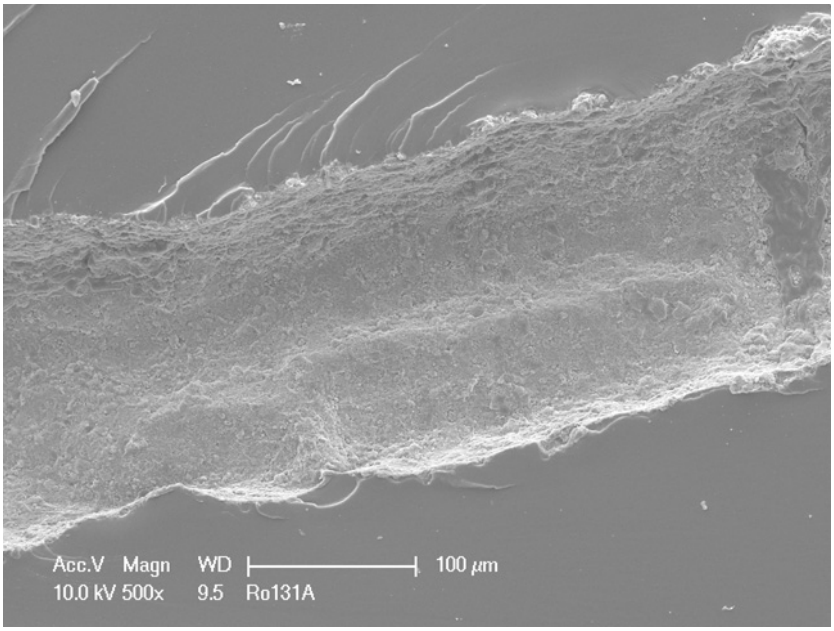
Beckman Institute - Room 3269

Structural Reinforcement of Microvascular Autonomic Composites using Layer-by-Layer Assembly

Solar Olugebefola — Post-doctoral Scientist, Materials Science & Engineering



Bulk polymers with incorporated microvascular networks, like their biological analogs have the ability to autonomously heal from inflicted damage through capillary release of liquid healing agent from exposed channels. Furthermore, these materials can be used for self-cooling applications through the substitution of a cooling phase. The networks are created through direct-write assembly of fugitive ink scaffolds followed by infiltration and polymerization of polymer precursors and removal of the scaffold.

Structurally, the presence of the microchannels weakens the material by acting as nucleation sites for microcracks as well as energetically favorable routes for crack propagation. Taking a biomimetic approach, we endeavor to locally modify the structure of the polymer near the channels in order to mitigate the weakening effect.

Using electrostatic layer-by-layer assembly (LbL) we have deposited thin films of aluminosilicate and polyelectrolyte onto as-written scaffolds such that they reside at the channel interior after polymerization. The technique allows nanoscale control over film thickness and by the choice of components, control over the film physical properties. Using fluorescent digital image correlation to measure local strains around single channels, we can determine the structural reinforcement effects of these multilayers.

Coffee and cookies will be served
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