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DNA-inks for 3-D Printing: DNA Composites for the Rapid Prototyping of Scaffold in Bioengineering Applications

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DNA-inks for 3-D Printing: DNA Composites for the Rapid Prototyping of Scaffold in Bioengineering Applications

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Rapid-prototyping has become an incredible technique that manufactures three-dimensional objects with intricate complexity down to 8 μ m of resolution. We are developing materials that can be used by rapid-prototyping instruments to make scaffolds for bioengineering applications. Our molecular design involves the polymerization of a (vinylbenzyl)trimethylammonium chloride and DNA solution. Upon UV illumination, the composite polymerizes and forms DNA-hybrid materials. The end result becomes a ductile transparent material with a thin cross-section. The synthesis, characterization and application of rapid prototyping will be described. Scanning Electron Microscopy (SEM), Light Scattering Detector (LDS), Nuclear Magnetic Resonance (NMR), and Infrared Spectroscopy indicate the structure, characteristics, and the presence of the DNA-polymer. Analyses that test the mechanical properties of the scaffolds will be discussed.