

Immobilization of *E. coli* via Dip-pen nanolithography utilizing M-9 ink

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Dip-Pen Nanolithography (DPN) is a depositing and printing technique that can print a range of molecules and nanoparticles with 5 nm resolution. These molecules and nanoparticles may be printed on a variety of substrate surfaces. Using the sulfur binding affinity and orientation for the positive charge on an M-9 carborane thiol, a positive electrical field pattern can be printed on a gold surface. The goal of this study is to demonstrate how DPN can be used to print a pattern that will cause bacterial cells to be immobilized on an electrical grid. Controlling bacterial orientation and location relative to adjacent bacteria at the nano-level provides opportunities to investigate bacterial extracellular interactions. The cellular membranes of certain bacteria have a zeta potential across the extracellular border and intracellular cytoplasm that can be utilized to immobilize cells. DPN can use this charge for immobilization, which can be of practical use in the biological sciences. A common bacterium with a strong negative charge at a near neutral pH is ideal for this study. It was determined that *E. Coli JM109* had all properties necessary for effective immobilization via DPN.

Biography

Hultman is the director of the Minor in Nanotechnology program at Gannon University. He is doing research in nanotechnology self assembly using dip pen nanolithography along with synthesizing carbon nanotubes via CVD.

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