ABSTRACT
Frequency Selective Surfaces (FSS) are a potent variety of metamaterials that, depending on the surface geometry, can be used to engineer specific radiation properties such as directional emission, linear and circular polarized emission, and spectral selectivity. The difficulty is in creating FSS that are uniformly developed over large areas, as e-beam lithography and other patterning techniques, while suitable for laboratory work, have difficulty in producing large areas due to cost, speed, and other factors. Nanosphere Photolithography (NSP), using a self-assembled array of spheres as microlenses to focus light into the photoresist, provides an alternative that can be scaled to sufficiently large areas. This technology has been proven to develop hexagonal arrays of holes or pillars with variable periodicity and diameter. A similar process is described to better facilitate reel-to-reel manufacturing for larger areas of nanostructures, as well as a process to greatly broaden the type of patterns that can be developed with such a technique.