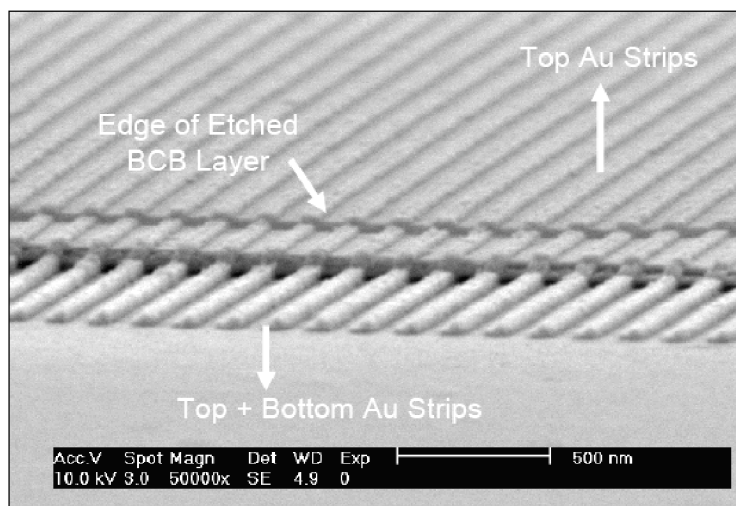

EBL Fabricated Negative Refractive Index Materials Based on Metallic Strips Embedded in a Dielectric

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Micrograph of a electron-beam-lithography fabricated monolayer of aligned top and bottom Au strips, embedded in the dielectric BCB host. All layer thicknesses and vertical spacings are 10~20nm. Grating periods are 150nm, with strip widths of ~80nm.

A structure of negative index materials in mid- and near-infrared wavelength range rely on paired metallic strips. Induced currents of the symmetric and antisymmetric mode are each responsible for the electric and magnetic resonances. In optical domain, the two resonances are, however, separated in frequency and an overlapping negative index band disappears. We attempted inserting a continuous 20nm layer of metal between the strips while keeping them aligned, the design of which is shown through numerical simulations to retain the negative index band. The sample was fabricated through a layer-by-layer process and alignment of the top and bottom strips through the electron-opaque continuous film was realized with alignment marks defined together with the bottom strips and exposed before defining the top strips. An optical setup has been constructed to characterize the sample. Preliminary results show a negative index band between 0.95 μ m and 1.1 μ m. This project is supported by the Air Force Office of Scientific Research under award number FA9550-06-1-0279.