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Fabrication of a Scalable Free Standing Single Layer Silver Nanomesh TIANYI SUN, CHUANFEI GUO, KRZYSZTOF KEMPA, ZHIFENG REN, Boston College — We present a method of fabricating scalable free standing single layer silver nanomeshes with uniform linewidth. The method consists of In_2O_3/SiO_x bilayer lift-off metallization, HF-H_2O_2 based catalytic etching and a chemical lift-off process. Since the linewidth and the mesh size can be well tuned by the isotropic etching of In_2O_3 islands within a broad range, this method is capable of generating nanomeshes meeting different electrical, optical, and mechanical requirements. Using this method, a 45 nm thick silver nanomesh with 20 % metallic coverage (line width 120 nm) has an average transmittance of 65 % over the whole visible range and a sheet resistance of about 10 Ω/sq. To the best of our knowledge, this is the first time that a cost-effective scalable free standing silver nanomesh with uniform linewidth was obtained. Such nanomeshes may find applications in a lot of fields where good flexibility, high transparency, and good electrical conductivity are required simultaneously, such as flexible transparent electrodes.

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