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Optical Properties of Scalable Nano-Mesh Films KYLE ALVINE, BRUCE BERNACKI, WENDY BENNETT, ALAN SCHEMER-KOHRN, Pacific Northwest Natl Lab — We describe here the optical properties of a scalable nano-mesh film both experimentally measured and calculated by FDTD numerical modeling. Typically, applications for optically responsive nano-plasmonic or photonic films are limited by virtue of tractable fabrication techniques to several hundred microns or a few millimeters in size. The films described here have been demonstrated over an extent of several inches and could be readily scaled to larger sizes. The films are comprised of a quasi-regular periodic array of nanoscale holes in a metallic film. The nanostructure is fabricated in a scalable fashion in a multi-step fashion via sputtering on a nanoscale template created by nanoparticle self-assembly. Both the numerical modeling and experimentally measured scattering demonstrate that these films are highly resonant with the resonance location in the visible or near infrared and set by the hole size and pattern geometry. Such films can also be readily be made on flexible substrates if desired. Potential applications include new proposed photonic thermal management coatings or plasmoelectric devices.

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