

## **A General Method for Producing Flexible Metamaterials**

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We demonstrate a mass production of high-quality flexible metamaterials by a roll-to-roll process for large area assembly of photonic crystals. We combine state-of-the-art nanoparticle fabrication and polymer opal technology to achieve angle-dependent or mechanical-sensitive colormetric and photometric performance. The flexible films incorporating Au or Fe nanoparticles exhibit tunable optical or electromagnetic resonances in response to external stimuli such as magnetic and electric fields. These materials could be used in applications, such as 5G, sensors, and medical treatments.