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Plasmonically Enhanced Second-Harmonic Generation from Metallic/Organic Hybrid Self-Assembled Films KAI CHEN, CEMIL DURAK, RANDY HEFLIN, HANS ROBINSON, Department of Physics, Virginia Tech, Blacksburg, VA, 24061 — We have fabricated a new class of second order nonlinear optical materials by combining ionic self-assembled multilayer (ISAM) films with silver nanoparticle arrays in a non-centrosymmetric geometry. These hybrid films exhibit second-harmonic generation (SHG) efficiencies as much as 1600 times larger than unmodified, conventional ISAM films, which makes a three bilayer hybrid film perform at the same level as a micron thick, 700-1000 bilayer film. This was accomplished by using nanosphere lithography to deposit silver nanoparticles on the ISAM film, tuning the geometry of the particles to make their plasmonic resonances overlap the frequency of optical excitation. Even though the enhancement is already large, we suggest that further refinements of the techniques are expected to lead to additional enhancements of similar or larger magnitude.

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