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Engineering an epitaxial dielectric/metal/dielectric trilayer system¹ JISUN KIM, Department of Physics, The University of Texas at Austin, YANG MENG, Z.Q. QIU, Department of Physics, University of California at Berkeley, CHIH-KANG SHIH, Department of Physics, The University of Texas at Austin — Ag is a favorable material platform for plasmonic applications. Most plasmonic devices to date have been based on granular polycrystalline metal films, which suffer from scattering due to surface roughness. Recently, superior plasmonic properties have been demonstrated by using atomically smooth epitaxial Ag(111) films grown on Si(111), illustrating the advantages of an epitaxial approach. For further device applications of the above example, it is desirable to create epitaxially grown dielectric/metal/dielectric multi-layer systems. Here we report successful epitaxial growth of a MgO(001)/Ag(001)/MgO(001) trilayer system which can be used as a material platform for creating multi-layered (dielectric/metal)_N heterostructures with any desired number, N. This type of new structure can be utilized for plasmonic devices with a wider wavelength range due to the transparency of MgO substrates in visible light. Moreover, it can open a door to new integrated devices with high quality atomically smooth films.

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Jisun Kim
jisun.kim@utexas.edu
Department of Physics, The University of Texas at Austin

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