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Quantum Engineering of Ultra-thin Films for Plasmonic Studies CHARLOTTE SANDERS, JISUN KIM, University of Texas, Austin, B.-H. LI, Institute of Physics, Chinese Academy of Sciences, JAMES MCILHARGEY, University of Texas, Austin, XIANGGANG QIU, Institute of Physics, Chinese Academy of Sciences, GENNADY SHVETS, C.K. SHIH, University of Texas, Austin — The plasmonic properties of polycrystalline films are presumed to be strongly affected by grain boundary scattering and consequent damping of plasmonic resonances. However, to date there have been few systematic studies comparing plasmonic measurements in polycrystalline and single crystal films. Extraordinary optical transmission (EOT) is the phenomenon of strongly enhanced optical transmission through subwavelength apertures in metallic films, and results from coupling between incident light and plasmons on the film surface. In this talk we will present data comparing the plasmonic properties of single- and polycrystalline Ag thin films probed using EOT in the far- and mid-infrared regimes, and will discuss the epitaxial growth methods used to obtain highly perfect single-crystal films. Our findings show strong plasmonic enhancement in the single-crystal samples at key resonances, as well as suppression at certain wave numbers. The data will also be compared with results of simulation.

Charlotte Sanders
University of Texas, Austin

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