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Alloyed Noble Metal Nanoparticles with Tunable Optical Properties GARRETT C. WESSLER, CHEN GONG, Institute for Research in Electronics and Applied Physics, Dept. of Materials Science Engr., Univ. of Maryland College Park, MARIAMA REBELLO DE SOUSA DIAS, Institute for Research in Electronics and Applied Physics, Univ. of Maryland College Park, JOSHUA A. TAILON, LOURDES G. SALAMANCA-RIBA, Dept. of Materials Science Engr., Univ. of Maryland College Park, MARINA S. LEITE, Institute for Research in Electronics and Applied Physics, Dept. of Materials Science Engr., Univ. of Maryland College Park — Noble metal nanoparticles (NPs) have been widely used in sensing, optics, and catalysis applications by taking advantage of surface plasmon resonance (SPR). This response is slightly tuned by varying the size and shape of the NPs; however, a method to obtain truly on-demand plasmonic responses is still lacking due to the intrinsic nature of a metal's dielectric function. Here, we fabricate size and composition controlled metal alloy NP arrays by deposit-and-anneal methods and through-template depositions. We control the composition of the metal NPs by co-sputtering and by alternating electron-beam evaporation of the Ag and Au targets. To characterize the NPs, macroscopic transmission measurements are combined with spectrally dependent near-field scanning optical microscopy to show the local optical properties around the NPs. By varying the atomic fraction of Ag and Au in the alloys, we modulate the optical properties of the NPs for different applications. For example, hot carrier plasmonic devices necessitate high absorption in the visible range, while photovoltaic applications require low absorption by the NPs.

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