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Angle- and position-resolved plasmon coupling in gold nanocrystal dimers LEI SHAO, JIANFANG WANG, The Chinese University of Hong Kong — Interactions between the localized plasmons of metal nanocrystals have attracted much attention, because of their applications ranging from photonic devices to biomolecular detection. Gold nanorods (NRs) exhibit both the transverse and longitudinal plasmon modes, with the latter being strongly polarization-dependent. We have studied the coupling in Au NR homodimers and Au NR-Au nanosphere (NS) heterodimers. Experimental observations, as well as simulations, have revealed a number of interesting phenomena in the plasmon coupling. First, both the antibonding and bonding modes are existent in the NR dimer system and their intensity ratio decreases exponentially as the NR angle increases. Second, the NR-NS heterodimers exhibit Fano resonance properties and a NS-site-dependent coupling behavior. We believe that our results will be useful for developing complex plasmon-based photonic devices and ultrasensitive plasmonic sensors. The NR-based dimers can also potentially function as building blocks for the construction of metamaterials.

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