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Highly tunable gold nanorod dimer resonances mediated through conductive junctions JAKE FONTANA, BANAHALLI RATNA, Naval Research Lab — Tailoring the resonant frequency in plasmonic nanostructures is critical to developing disruptive metamaterial technologies. Here we numerically study the optical properties of gold nanorod dimers connected end-to-end by a thin metallic bridge [1]. We find the resonant frequency along the long axis of the dimer shifts linearly with the nanorod aspect ratio behaving as it was a single nanorod with an aspect ratio nearly an order of magnitude larger. We show by controlling the material and geometry of the connecting bridge the effective depolarization factor of the dimer is significantly modulated tuning the resonant frequency over a decade, from 1 to 10 μm. We present an alternative description for the emergence and behavior of the dimer resonance using a straightforward "Drude-like" model and self-assembly experiments creating such structures.

[1] J. Fontana and B. R. Ratna, Applied Physics Letters **105** (2014).

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