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Lightning-rod-effect-directed photo assembly of gold nanorods and spheres in a colloidal suspension[1] SEYYED MOHAMMAD HOSSEIN ABTAHI, Virginia Tech Dept. of Chemical Engineering, XI GUO, WEBSTER L. SANTOS, Virginia Tech Dept. of Chemistry, HANS D. ROBINSON, Virginia Tech Dept. of Physics, RICHEY M. DAVIS, Virginia Tech Dept. of Chemical Engineering — We describe a method for making colloidally stable gold nanorods that can be photo-functionalized at their ends—the plasmon hot spots—while dispersed in a fluid. Such particles could be used in supramolecular self-assembly and in developing chemical sensors. Gold nanorods—approximately 60 nm long and 20 nm in diameter—were functionalized with combination of mono-thiol PEG and a photophotocleavable *o*-nitrobenzyl ligand. The PEG serves to help stabilize the gold nanorods suspended in a mixture of water and alcohols so that the assembly can stably be done in suspension. The functionalized gold nanorods were then exposed to UV light that triggered photocleavage, resulting in the formation of positively charged amine groups. When these rods were mixed with negatively charged gold nanospheres, there was a red-shift in the wavelength of the longitudinal plasmon peak of more than 20-30 nm, indicating the preferential binding of gold nanospheres to the ends of the gold nanorods, which we attribute to the lightning rod effect.

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