Abstract: The interaction of light with molecules can be used to access new modes of chemical reactivity; however, this interaction is often difficult to exploit in a universal manner. I will describe how plasmonics is proving to be a general strategy for interfacing photons with molecules and activating chemical transformations and even inducing emergent chemistry. In my laboratory, catalysts based on plasmonic nanoparticles are allowing light to be used as a redox equivalent in chemical reactions, for promoting non-equilibrium chemical processes, for modifying product selectivity, for photosynthesizing fuels, and for boosting electrochemical conversions. I will provide a deeper view of the excited-state structures, species, and mechanisms that underlie these phenomena at the nanoparticle–solution interface.