Hybridizing Light and Matter – Consequences for Chemical and Material Sciences

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The demonstration that material and chemical properties can be manipulated by using hybrid light-matter states has stimulated considerable interest over the past decade [1,2]. Such hybrid light-matter states can be generated by strongly coupling the electronic or the vibrational transitions of a material, to the spatially confined electromagnetic field of an optical resonator. Most importantly, this occurs even in the dark because the coupling involves the zero-pointelectromagnetic fluctuations of the resonator. After introducing the fundamental concepts, examples of modified properties of strongly coupled systems, such as chemical reactivity, self-assembly, conductivity, energy transfer and magnetism will be given to illustrate the broad potential of light-matter states.

Reviews: [1] F.J. Garcia Vidal, C. Ciuti, T.W. Ebbesen, *Science* **2021**, 373, eabd336
[2] K. Nagarajan, A. Thomas, T.W. Ebbesen, *J. Am. Chem. Soc.* **2021**, 141, 16877.

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