

STRONG COUPLING: HARNESSING LIGHT-MATTER ENTANGLEMENT IN QUANTUM TECHNOLOGIES

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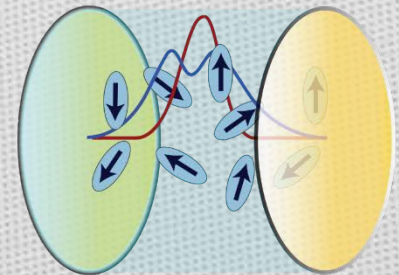
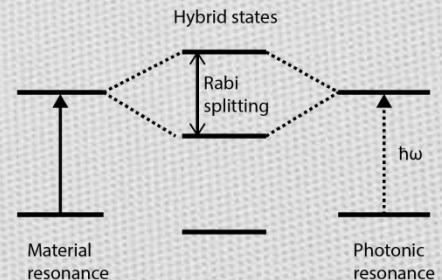
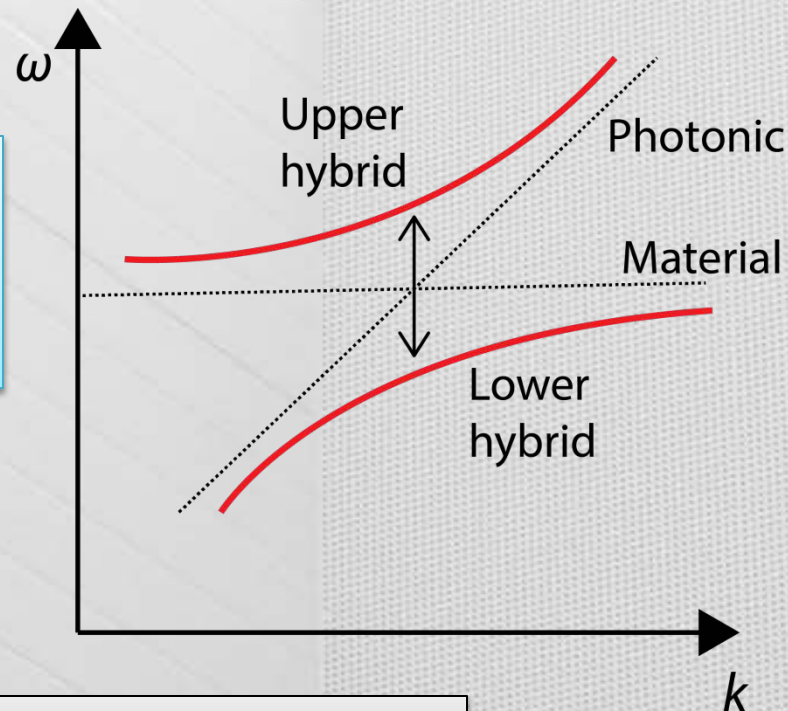
Photonics Center, IPB
University of Belgrade



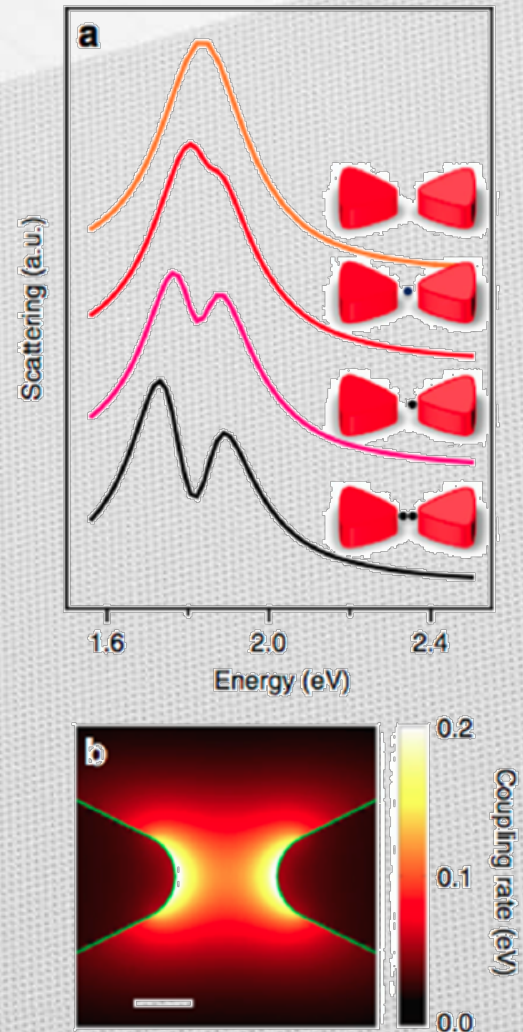
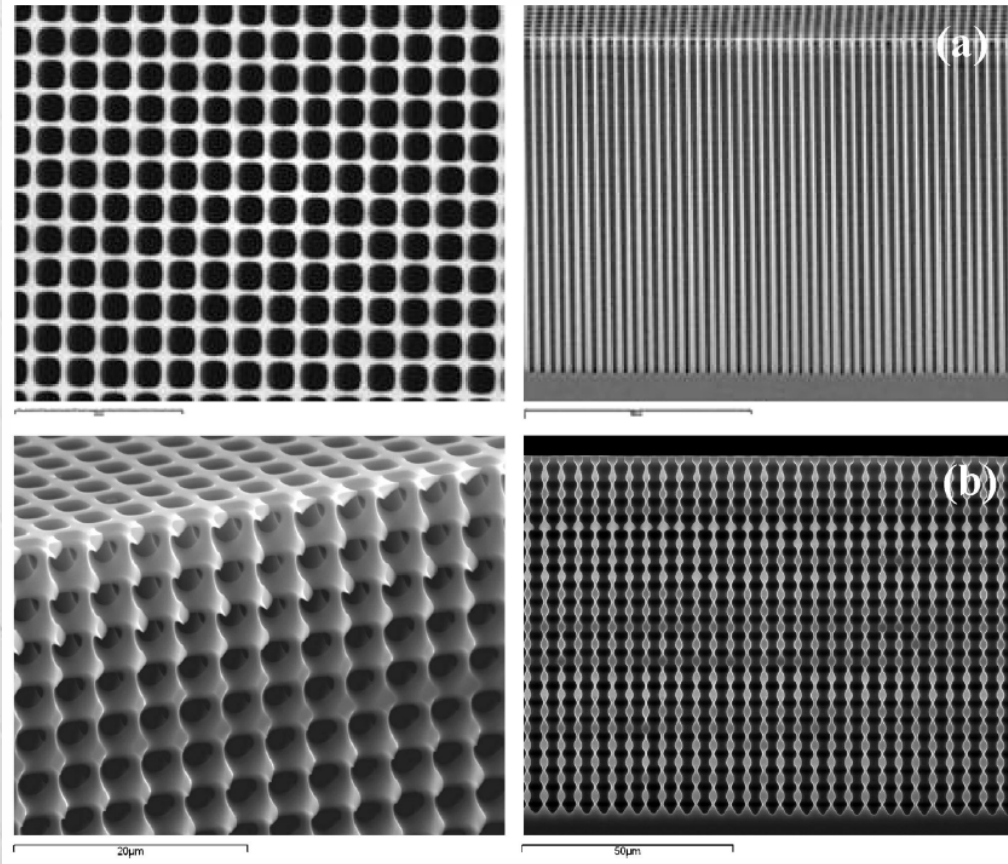
- importance of mesoscopic quantum coherence for quantum technology
- effects of decoherence
- strong coupling - robust light-matter entanglement by nanostructures (photonics and plasmonics)

WHAT IS THE STRONG COUPLING?

Unusual hybridisation
between matter and light

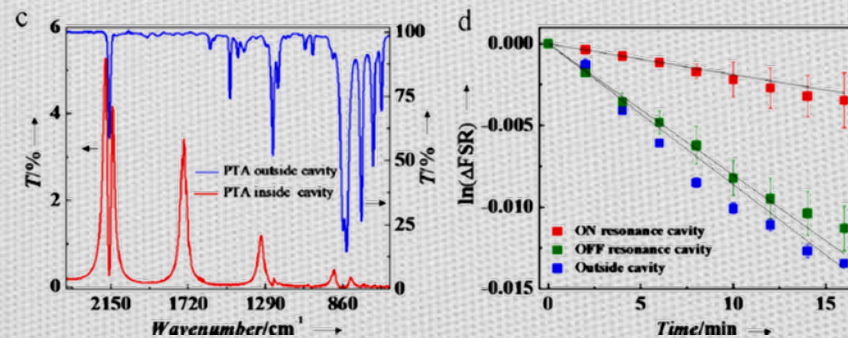
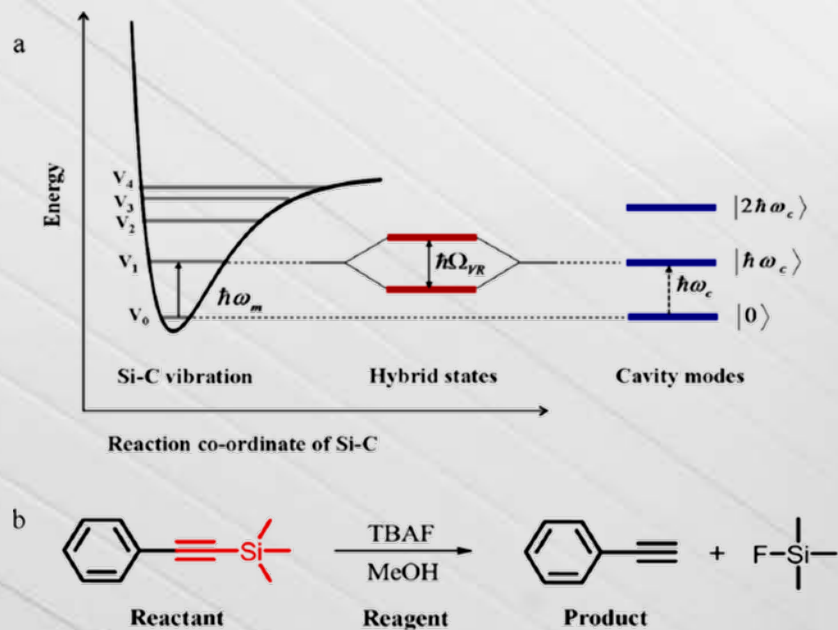


NANOSTRUCTURES USED TO ACHIEVE STRONG COUPLING



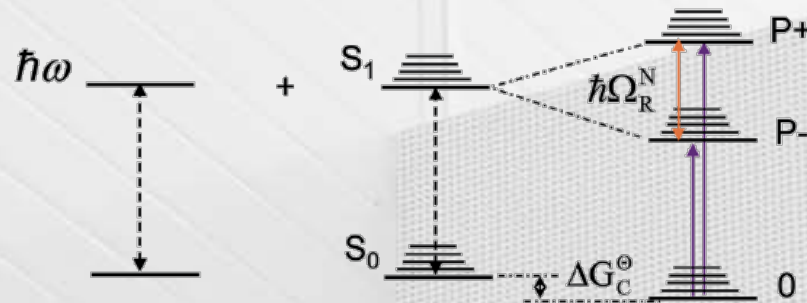
Strong Light–Matter Coupling as a New Tool for Molecular and Material Engineering: Quantum Approach, Branko Kolaric, Bjorn Maes, Koen Clays, Thomas Durt, and Yves Caudano, *Advanced Quantum Technologies* (2018)

STRONG COUPLING IN CHEMICAL REACTIONS

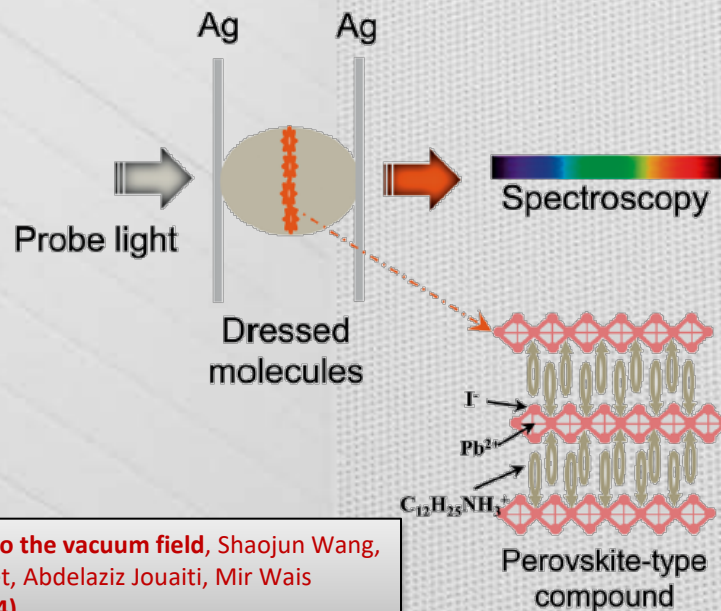


STRONG COUPLING IN MATERIAL SCIENCE: PHASE TRANSITIONS

(a) Cavity resonance Molecular transition Hybrid states

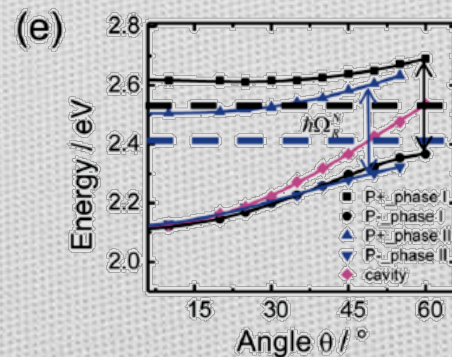
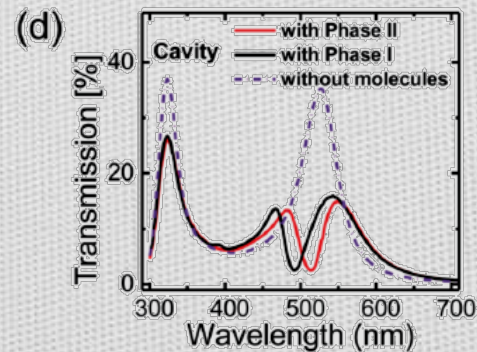
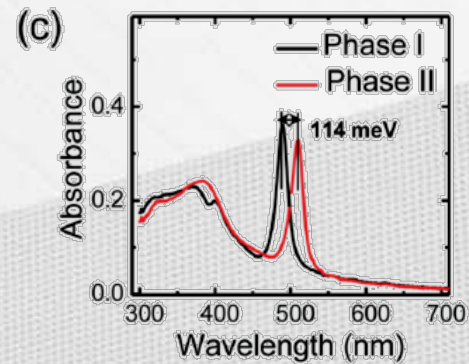
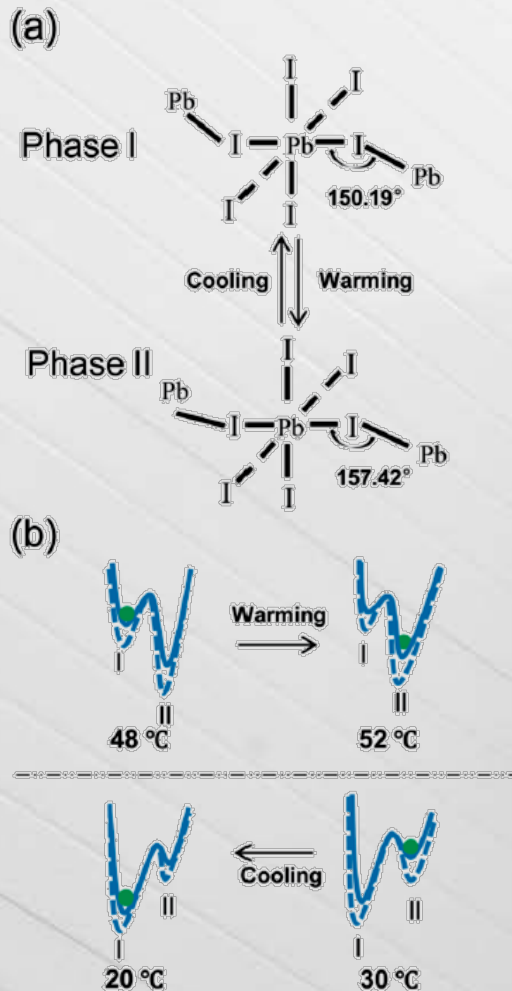


(b)



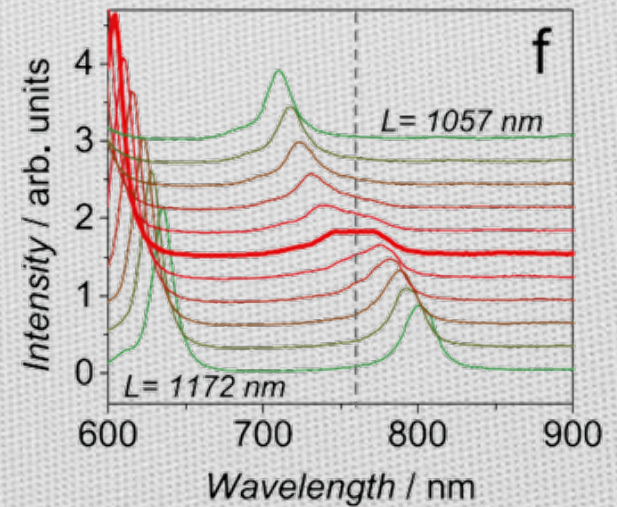
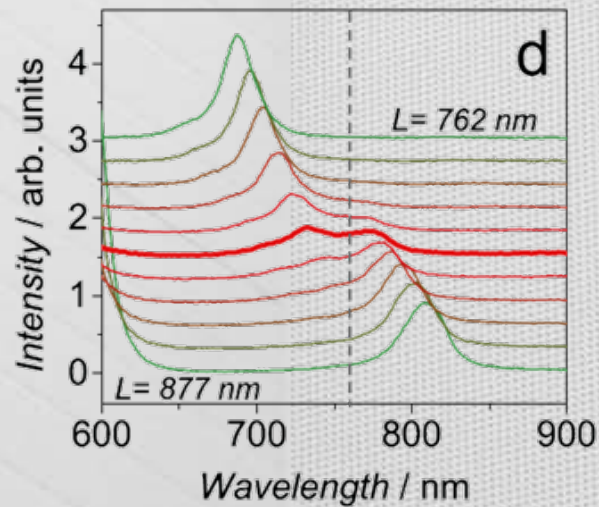
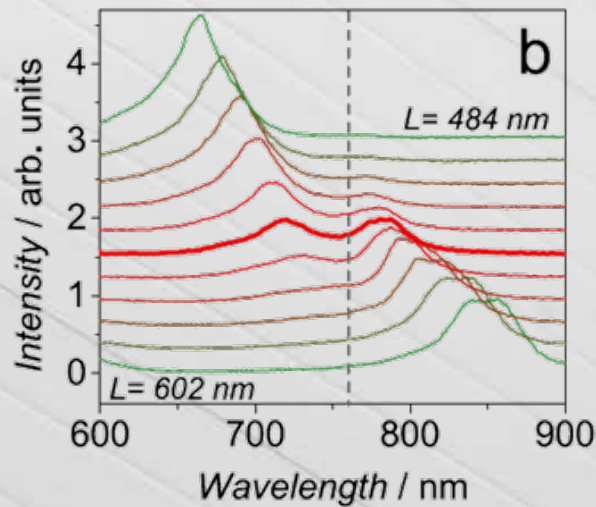
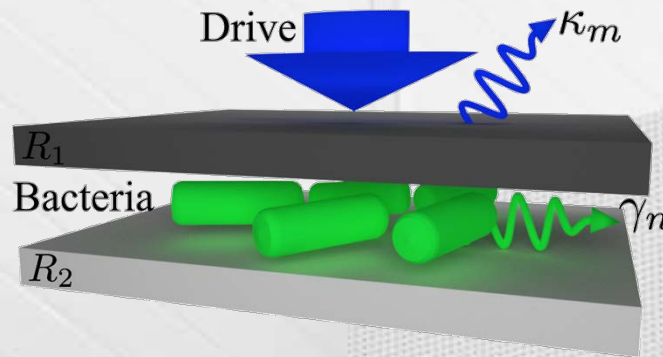
Phase transition of a perovskite strongly coupled to the vacuum field, Shaojun Wang, Arkadiusz Mika, James A. Hutchison, Cyriaque Genet, Abdelaziz Jouaiti, Mir Wais Hosseini and Thomas W. Ebbesen, *Nanoscale* (2014)

STRONG COUPLING IN MATERIAL SCIENCE: PHASE TRANSITIONS



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STRONG COUPLING IN BIOLOGY



A Nanophotonic Structure Containing Living Photosynthetic Bacteria, Coles, D., Flatten, L.C., Sydney, T. et al. (8 more authors), *Small* (2017)

CONCLUSION

Controlling and molding chemical processes and material properties.

SC concept unifies many ideas, offering magnificent dreams and perspectives in physics, chemistry, engineering, and technology.

CURRENT RESEARCH

Controlling radiative relaxation by strong coupling, *T. Durt, B. Kolaric*

Molding methane- gas conversion by strong coupling, *B. Kolaric*