Title:	Investigation of light-matter strong coupling using open single mirror cavity
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Abstract:	Strong light-matter coupling is a microscopic phenomenon where new hybrid states are generated from the interaction of photon and the transition dipole moment of molecules and materials. As a result of this interaction, the characteristics of the molecule changes. Up until recently, it was believed that only complex structures such as Fabry-Perot, Kretschmann configuration or dielectric resonators were capable of creating the confined electromagnetic fields required for strong coupling to organic molecules. This, however, may not be true. The purpose of this dissertation is to design a simpler geometry that allows for a molecule to undergo strong coupling. Strong coupling can be achieved due to the impedance mismatch and thereby modification in the field distribution between an exciton layer and a single metal mirror configuration. A single metal mirror has larger field loss than any standard FP cavity, hence, a material with a high oscillator strength is employed to compensate for the loss. Strong coupling regime was realized for selected samples with specific thickness and oscillator strength. Experimental data is compared with transfer matrix simulations to understand the electromagnetic field distribution in the coupled and uncoupled system. Dispersion experiments collected from the samples suggest the formation of polaritonic states. In general, such open cavity configuration can be effectively utilized to modify function properties of molecules and materials.
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