Abstract Submitted
for the MAR16 Meeting of
The American Physical Society

Two-photon up-conversion affected by inter-molecule correlations near metallic nanostructure[1] YOSHIKI OSAKA, NOBUHIKO YOKOSHI, HAJIME ISHIHARA, Osaka Prefecture University — Optical antennas, which consist of metallic nanostructures, concentrate free-propagating light into localized surface plasmons (LSP). Such a localized field enables effective interactions between light and molecules nearby the metal surfaces. However, as the light intensity decreases to single-photon level, large dissipation in the metals always inhibits the effective photon-molecule interaction via LSP. We have theoretically elucidated that controlling quantum interference in an antenna-molecule coupled system strongly suppresses the photon-dissipations, and leads to efficient two-photon processes in the molecule. However, it is difficult to prepare only one molecule nearby the metal. Therefore, as a beachhead into a multi-molecule system, we will consider the case that two photons couple with two molecules under one LSP. In rapid intuition, the appearance of the second molecule seemingly damages the up-conversion process. In the presentation, we reveal that controlling the inter-molecule interaction could resolve the difficulty, and lead to the efficient up-conversion through the quantum interference among three-bodies, i.e., LSP and two molecules.

[1]Supported by a Grant-in-Aid for JSPS Fellows No. 13J09308

Yoshiki Osaka
Osaka Prefecture University

Date submitted: 27 Oct 2015 Electronic form version 1.4