Abstract Submitted
for the MAR05 Meeting of
The American Physical Society

Time-dependent quantum process for electrons assisted by oscillating electric field MASAKAZU MURAGUCHI, KYOZABURO TAKEDA, Waseda University, YUSUKE ASARI, Institute of Industrial Science, University of Tokyo, NAOKI WATANABE, Mizuho Information & Research Institute, Inc. — Significant advances in nanometer-scale techniques have enabled us to control the transport phenomena of electrons artificially. In order to control the electronic states of the quantum dots by using oscillated electric field (OEF), the time development features of the electron wave function should be fully understood, because the state of electron changes sharply for a short time. Here, we study time-dependent quantum process for electrons assisted by OEF based on solving the TD Schrödinger equation numerically both in the real-space and -time. Introducing the effective lifetime of an electron in the quantum dot, we discuss how OEF modulates the transmitting probability. We especially focus on the relationship among the lifetime, the strength and frequency of the injected electric field while varying the potential profile. We will further report the effect of the electromagnetic radiation caused by electron's self-motion as well as the inter-electron interaction.

Masakazu Muraguchi
Waseda University

Date submitted: 22 Mar 2013 Electronic form version 1.4