

Abstract Submitted
for the MAR09 Meeting of
The American Physical Society

Analysis of Electron Spin Relaxation Momentum Time in Narrow Gap Semiconductor Quantum Well and Dots: Including Rashba and Dresselhaus Effects YUNG-SHENG HUANG, JUNG-SHENG HUANG, College of EECS, Semiconductors Research Laboratory, I-Shou Univ., 840 Kaoshiung, Taiwan. — A model of GaAs quantum dots embedded in a quantum wire is studied. We want to investigate how the electron spin relaxation momentum time (SRT) is varying with some physical parameters. We find that SRT decreases while the four parameters, external magnetic field, surrounding temperatures, both quantum wire width and thickness increase. The reason is caused by more and more phonons resulted in a higher scattering probability between electrons and phonons. Thus the SRT is reduced. Besides, Lommer and Silva showed that in narrow gap semiconductor bulk materials, the Rashba effect is larger than Dresselhaus effect. Our results show that Dresselhaus effect is larger than Rashba effect for the quantum well under electric field, especially when the quantum well width is small. The authors are interested in studying whether the same characteristics exist in quantum dots. We are working on this line.

Yung-Sheng Huang
College of EECS, Semiconductors Research Laboratory,
I-Shou Univ., 840 Kaoshiung, Taiwan.

Date submitted: 10 Dec 2008

Electronic form version 1.4