Intense terahertz laser fields on a two-dimensional electron gas with Rashba spin-orbit coupling

J. L. Cheng

Hefei National Laboratory for Physical Sciences at Microscale and Department of Physics, University of Science and Technology of China, Hefei, Anhui, 230026, China

The spin-dependent density of states and the density of spin polarization of an InAs- based two-dimensional electron gas with the Rashba spin-orbit coupling under an intense terahertz laser field are investigated by utilizing the Floquet states to solve the time- dependent Schrödinger equation. It is found that both densities are strongly affected by the terahertz laser field. Especially a terahertz magnetic moment perpendicular to the external terahertz laser field in the electron gas is induced. This effect can be used to convert terahertz electric signals into terahertz magnetic ones efficiently.

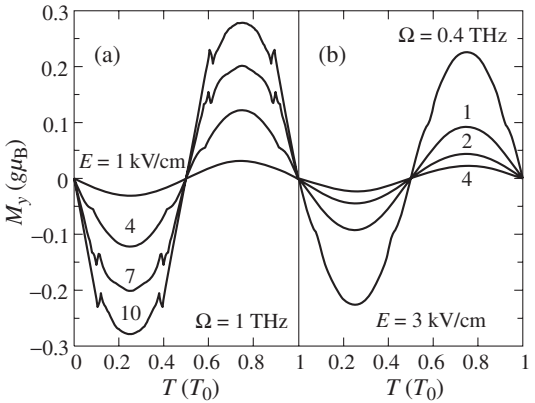

Figure 1. The average magnetic moment M_y versus the time at $E = 1$, 4, 7 and 10 kV/cm for $\Omega = 1$ THz (a) at $\Omega = 0.4$, 1, 2 and 4 THz for fixed $E = 3$ kV/cm (b). The electron density is $N = 10^{11}$ cm^{-2}.

Bibliography

[1] J. L. Cheng and M. W. Wu, Appl. Phys. Lett. **86**, 032107 (2005).