

Enhancement of Rashba coupling in vertical In_{0.05}Ga_{0.95}As/GaAs quantum dots

Huang S., Badrutdinov A., Serra L., Kodera T., Nakaoka T., Kumagai N., Arakawa Y., Tayurskii D., Kono K., Ono K.

Kazan Federal University, 420008, Kremlevskaya 18, Kazan, Russia

Abstract

We study the spin-splitting energies in low-potential-barrier quantum dots, finding splitting energies that are orbital state dependent. The theoretical analysis is done with a generalization of the Fock-Darwin states in the presence of spin-orbit interactions. We discuss experimental evidence indicating that the Rashba interaction strength in vertical In_xGa_{1-x}As/ GaAs quantum dots is in the range $80 \text{ meV \AA} \leq \lambda R \leq 120 \text{ meV \AA}$. This enhanced spin-orbit interaction can be understood from the high penetration of the electron wave function into the quantum well with low-potential barrier. © 2011 American Physical Society.

<http://dx.doi.org/10.1103/PhysRevB.84.085325>
