Enhancement of spin lifetime in quantum well lasers using interfacetation quantum dots

RYAN WOODWORTH, Pennsylvania State University, ARI MIZEL, Science Applications International Corporation, RUSKO RUSKOV, Ames National Laboratory, GERALD MAHAN, Pennsylvania State University — Research on semiconductor heterostructures provides many insights into the next generation of optoelectronic devices. In particular, the gain of a microdisk laser seems to be enhanced by the presence of a long-lived optical cavity mode. Here we analyze a recent experiment using GaAs-AlGaAs microdisks with interface fluctuation quantum dots. A numerical simulation shows enhancement of spin dephasing time in the conduction band due to exchange scattering and D’yakonov–Perel’ coupling. Possible applications to quantum computing are discussed.