

Abstract Submitted
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Measurement of the spin detection efficiency of the s, p,d, and f shells in InAs QDs using optical pumping¹ M. DIAZ-AVILA, M. YASAR, I. KHAN, A. PETROU, SUNY at Buffalo, C.H. LI, G. KIOSEOGLOU, B.T. JONKER, Naval Research Laboratory — We have carried out an optical pumping study of n-i-p AlGaAs(n)/GaAs(i)/AlGaAs(p) quantum wells (QW) structures that incorporate a single layer of InAs quantum dots (QDs) in the GaAs QW. The electron-hole pairs were photo-excited in the GaAs QWs and were subsequently captured by the InAs QDs. The resulting photoluminescence (PL) spectra contain features associated with recombination processes that involve electrons occupying the s-, p-, d-, and f-shells. The circular polarization of these features varies from 10 % to 30 % and increases monotonically from the s- to the f-shell. From these circular polarization measurements the spin detection efficiency for each shell was determined as function of temperature and longitudinal magnetic field applied along a direction perpendicular to the QD plane (z-axis). The optical pumping results, in combination with magneto-EL studies of Fe spin LEDs that have the same parameters and were grown under identical conditions were used to determine the injected electrons spin polarization in these devices.

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Mesut Yasar
SUNY at Buffalo

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