Electrical spin injection from Fe into Al$_x$Ga$_{1-x}$As quantum well spin-LEDs$^1$ IMRAN KHAN, MANUEL DIAZ-AVILA, MESUT YASAR, ATHOS PETROU, SUNY at Buffalo, AUBREY T. HANBICKI, GEORGE KIOSEOGLOU, BEREND T. JONKER, Naval Research Laboratory — We have studied Fe spin LEDs in which electron-hole recombination takes place either in GaAs or in Al$_x$Ga$_{1-x}$As quantum wells (QW). The dependence of the electroluminescence circular polarization $P$ on temperature $T$ in these two types of devices at fixed magnetic field is compared. The polarization in the Al$_x$Ga$_{1-x}$As QW LEDs decreases much more slowly with temperature compared with the GaAs QW LEDs; the polarization of the former persists up to room temperature. The improved high temperature performance of the Al$_x$Ga$_{1-x}$As spin LEDs is tentatively attributed to the localization of the recombining electron-hole pairs by potential fluctuations in the QW. These sites have zero-dimensional character suppressing the Dyakonov-Perel spin scattering mechanism.

$^1$Work at SUNY was supported by ONR (N000140610174) and NSF (ECS0524403).