Abstract

The spin transport and dynamics of optically injected spin polarized carriers are studied with a high spatial and/or time resolution in semiconductor GaAs-based heterostructures in multiple transport regimes. An unexpectedly long-scale and high-speed spin diffusion transport is observed in a long-lived electron sub-system induced optically at an undoped single GaAs/AlGaAs heterointerface. A diffusion and drift-dominated spin transport is investigated using an electrical spin-detection via the inverse spin Hall effect in doped GaAs-based systems at room and low temperatures. It is shown that the inverse spin Hall signal and the spin transport parameters can be controlled by a direct application of an electric field or by expanding a depleted zone of a planar pn-junction.