The 122nd GREEN Seminar

Controlling and Manipulating g-Factors and Spin in Semiconductor Nanostructures

Chair: Dr. Kunie Ishioka (GREEN)

Prof. Christopher J. Stanton

(University of Florida, US)

The ability to engineer, control and manipulate spin in semiconductor nanostructures is important for a wide variety of novel spintronic applications. In this talk, we look at two ways of controlling the spin: 1) *g-factor* engineering and 2) *optical control.* For *g-factor engineering*, we focus on narrow gap nanostructures such as $InAs_xP_{1-x}$ alloys. Narrow gap materials offers a wide tunability of the *g*-factor from very large to small or even a zero g-factor, important for photodetectors for quantum information and sensing. We investigate how one can change and manipulate the g-factors and effective masses with: 1) quantum confinement, 2) magnetic impurities such as Mn, 3) magnetic fields, and 4) alloying. For *optical control*, we investigate optical pumped NMR (OPNMR) in GaAs structures. Here circularly polarized light creates spin-polarized electrons which can transfer their spin to the nuclei and then be detected by NMR. We show that a small change in laser excitation *wavelength* and *strain* can be used to change the spin polarization in these materials offering the intriguing possibility of optical and strain control of electronic and nuclear spin.

Venue: Middle Seminar Room, 8F, Central Bldg., Sengen-site
Date & Time: 15:00-16:00, Wednesday, 29 Oct. 2025
Language: English
Contact: ISHIOKA.Kunie@nims.go.jp