

## Circularly-polarized light-emitting diodes and its applications for bio-engineering.

Spin-LED consisting of ferromagnetic electrode and semiconductor LED structure, can emit directly circularly polarized light using transfer of spin angular momentum from carriers to photons. Aiming at a practical circularly polarized light sources, we study the improvement of spin-LED devices based on an atomic-level crystal-engineering control. Recently, we achieved circularly polarized light detection (2014), electrical helicity control (2014, 2018), and pure circularly polarized light emission at room temperature without external magnetic field (2017).

We also study the cancer detection technique using circularly polarized light as one of the applications using spin-LED devices. Spin-LEDs integrated at a tip of endoscope will provide the invasive, in vivo cancer diagnosis technique.

