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Polarized luminescence in silicon FREDERIC ROUX, GEORGES LAMPEL, YVES LASSAILLY, JACQUES PERETTI[1] — Although silicon is a widely used semiconductor in the microelectronic industry, few studies habe been performed so far about its spin-transport properties. Creating and manipulating both spin and charge of electrons in silicon could be very promising in the research of convenient spintronic devices. One way to create and detect spin orientation of the conduction electrons is to perform a photoluminescence experiment under optical pumping conditions. We will present here a stationary photoluminescence experiment. Silicon samples of various doping concentrations, at nitrogen or room temperature, are optically pumped by a Ti:saphir laser. In silicon, the spin relaxation time is much shorter than the carrier life-time, thus yielding to a weak polarization of the recombination radiation. Polarization spectra under either modulated excitation or modulated reception have shown spectral regions where the degree of polarization of the luminescence can be as high as 5 percents. The possibility of a depolarization effect by a transverse magnetic field will be discussed (Hanle effect).

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