Enormous success of electronic devices that we witness today is mainly due to the remarkable advancement in, now known as, conventional semiconductor technology. Semiconductor devices are based solely on the charge carried by electrons but apparently this is not the only property carried by electrons. Electronic spin is another key property of electrons which in past is completely ignored while contriving electronic gadgets. Researchers are now systematically examining both of these properties, charge and spin, for their simultaneous use in semiconductors. This fastest growing field is called spin based electronics or spin transport electronics or simply spintronics.

Rare-earth nitrides enter spintronic vista due to their intrinsic semiconducting and magnetic nature. Binary alloys of RE elements with nitrogen with formula RN crystallise in the simple rock salt structure. A number of series are ferromagnetic semiconductors and others may be half metals or metals and therefore are strong candidates for being spintronic materials. But to use them in applications effectively, we need to know their electronic structure and one path to determine their electronic structure is to study valence to conduction band electronic transitions in single crystal films of RNs.

In this presentation optical structure of REN thin films will be presented aiming to shed light on interband transitions and vibrational excitations by determining real part of the conductivity across the IR-visible-UV. REN thin films were prepared in Ultra High Vacuum apparatus at VUW. Earlier work, most of which is accomplished by spintronics group at VUW, suggests that GdN, the most studied REN compound, is semiconducting with a band gap of 1.3eV in its paramagnetic phase which tends to narrow down to 0.9eV in its ferromagnetic phase. SmN is the only known semiconducting material with a unique characteristic that its spin and orbital moment cancel. I now have established that EuN is also a semiconducting with an energy gap of 0.9eV (see figure).