Mesoscopic Materials Research Laboratory Seminar

September 6, 2013, 10:40-12:10

Science and Technology Research Building 3, Room 204

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Singlet oxygen generation at silicon nanoparticles: dependence on magnetic field

Energy transfer from photo-excited excitons in silicon nanoparticles to adsorbed oxygen molecules is well-known to generate oxygen in the reactive singlet state, a phenomenon whose possible applications range from photodynamic cancer therapy to car airbag detonators and novel explosives. Although many details of the energy transfer process are well-established, one of the tools that has not been extensively applied until now is the use of a magnetic field in order to perturb the exciton and oxygen spin states; doing so enables us to modify the exciton-oxygen triplet-triplet interaction and so to change the energy transfer rate.

In this way, the quenching of the exciton photoluminescence by the energy transfer to oxygen can be partially reversed, allowing us to detect the effects of the magnetic field and to study them as a function of nanoparticle size. A short introduction to the necessary magneto-optics will be given and preliminary results and modelling will be presented.